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INTERNATIONAL NUCLEAR SAFETY CONCERNS

HEARING

BEFORE THE

SUBCOMMITTEE ON ENERGY, NUCLEAR PROLIFERATION, AND GOVERNMENT PROCESSES

OF THE

COMMITTEE ON GOVERNMENTAL AFFAIRS UNITED STATES SENATE

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INTERNATIONAL NUCLEAR SAFETY CONCERNS

THURSDAY, MAY 8, 1986

U.S. SENATE,
SUBCOMMITTEE ON ENERGY, NUCLEAR
PROLIFERATION, AND GOVERNMENT PROCESSES,
COMMITTEE ON GOVERNMENTAL AFFAIRS,
Washington, DC.

The subcommittee met at 10:05 a.m. in room SD-342 Dirksen Senate Office Building, Hon. Thad Cochran (chairman of the subcommittee) presiding.

Present: Senators Cochran, Cohen, and Glenn.

OPENING STATEMENT OF SENATOR COCHRAN

Senator COCHRAN. The subcommittee will please come to order. This morning, our subcommittee is conducting a hearing to review a report of the General Accounting Office on the matter of international nuclear safety. The Chernobyl accident underscores the need to retain stringent safety standards for building and operating nuclear powerplants around the world.

The event has provided us with another lesson that nuclear energy, the highest of the high-technology industries, demands the highest level of care to protect the public as well as the environment. Chernobyl has also dramatized the fact that nuclear safety has international dimensions and that each nuclear nation must act responsibly and inform and protect not only its own citizens, but citizens of all nations.

As the number of nuclear plants increases throughout the world, it will be necessary for the international community to act even more energetically and responsibly to strengthen nuclear safety standards.

My own personal belief is that it is time that serious consideration be given to increasing the resources and the authority of the International Atomic Energy Agency to inspect, for safety purposes, all civilian nuclear facilities wherever they are located.

Regular safety inspections would be a useful step toward reassuring the world community that every effort is being made to ensure the safe use of nuclear energy.

Although the potential for serious nuclear accidents has been a central issue in the debate on the future of nuclear energy, information concerning the extent and seriousness of nuclear safety problems and international efforts to address them has not been readily available to the general public.

Last September, the General Accounting Office produced a report entitled, "International Response to Nuclear Power Reactor

Safety Concerns" which discussed the efforts of international organizations such as the IAEA to prevent or mitigate the consequences of nuclear powerplant accidents.

Appearing before the subcommittee today to discuss this report are four representatives of the GAO: Mr. Allan Mendelowitz, Mr. Tom Flaherty, Mr. Keith Fultz, and Mr. Dwayne Weigel.

We appreciate very much their being here. They are representatives of two divisions of the GAO: The National Security and International Affairs Division and the Resources, Community and Economic Development Division. They will discuss this GAO report and its implications for international nuclear safety.

We also have representatives of the Nuclear Regulatory Commission here today, Mr. James Shea and Mr. Jack Heltemes. We appreciate the cooperation of all of these witnesses, and we look forward to a very informative and productive hearing.

At this time, I will recognize the distinguished Senator from Ohio, Mr. Glenn, for any comments or statement that he might have.

OPENING STATEMENT OF SENATOR GLENN

Senator GLENN. Thank you, Mr. Chairman. Thank you very much. I do have a short statement. I think you are to be complimented. I think this is a very timely hearing. The subject of nuclear safety as a public policy issue will be with us, I suspect, for as long as nuclear energy is used by mankind, and that is going to be a long time.

It is of particular concern at this time with the Chernobyl accident still literally smoldering, even as we meet here. I think it is important to keep in mind that there is no magic bullet, there is no panacea to the problems of nuclear safety. Until nuclear technology matures to the point where an inherently safe reactor has been developed that becomes the norm for production of nuclear generated electricity, we must rely on strict and uncompromising regulation of nuclear power to keep nuclear risks within acceptable bounds.

That is true both on not just a national basis here, but as Chernobyl is showing us, it is also true on an international basis. That has been demonstrated now for the first time on a graphic scale. Adequate regulation cannot proceed in an information vacuum. If nations continue to view the sharing of safety related information, of the establishment of safety standards as something they can choose to do or not to do on the basis on sovereign judgments alone, then the risk of nuclear accidents will not be sufficiently lowered to prevent the further erosion of public support for nuclear energy, public support here, in Europe, in the Far East, and even in the Soviet Union itself, even with their limited information distribution systems to their own people.

Last week I released an unclassified version of a report by the GAO entitled "International Response to Nuclear Power Safety Concerns." This report points out that information on the extent and seriousness of nuclear safety incidents in the West, as well as in the East, is not readily available.

We negotiated a release of some of the data contained in the original classified version. The data showed that there were at least 151 significant or potentially significant nuclear safety incidents in 14 countries during the period 1971 to 1984.

Since this data did not include the United States or Soviet bloc states, this means that at the least that serious nuclear safety incidents have occurred in nearly every non-Soviet bloc country with a reactor.

GAO estimates that by the year 2000, more than half the countries in the world that have reactors will be developing countries. What does that mean?

Well, the Soviet accident shows that we cannot presume to be safe merely because a nuclear reactor is located within someone else's borders. Nuclear safety is an international as well as a national problem and requires international cooperation as well as national regulation.

I repeat that over half of the countries by the year 2000 that will have nuclear reactors will be developing countries, many of them without the technical base, without the nuclear history and background and technicians and scientists to take care of any accidents or unexpected incidents that may occur.

In a letter I sent to the President after releasing the GAO report, I suggested that it was time to develop mandatory, international standards for safety and reporting, perhaps working through the IAEA. That will not be easy, and it will not likely happen soon, Chernobyl notwithstanding. There are some practical problems. IAEA is already overburdened. With the facilities they have, the people they have, the equipment they have, I think most of us have felt that they are just barely doing an adequate job, trying as hard as they can; barely able to do an adequate job in carrying out their safeguards responsibility.

I would add here that safeguards that we talk about, sounds good, "safe" and "guard," two great words. But actually, what IAEA does is basically operate as an information gathering, monitoring system to detect whether materials have been diverted to nuclear weapons use. That is their main responsibility. So to ask them to be the investigative body or to set the safety standards themselves is a big order without expanding IAEA and, indeed, changing its whole mission.

Where will these resources come from to expand its activities in the safety area, and does the agency really want the task of doing safety inspections? We haven't talked to them yet about this, even if the resources could somehow be made available.

Despite these difficulties, we must examine all possibilities to improve nuclear safety worldwide, as Chernobyl points up.

One thing the United States can do on a bilateral basis now is to better implement section 407 of the Nuclear Nonproliferation Act. This section requires the President, in negotiating nuclear agreements with other countries, to incorporate provisions offering U.S. cooperation and protecting the international environment against radioactive, chemical or thermal contamination arising from peaceful nuclear activity.

That doesn't require any new legislation. The administration can move in that area and move right now, if they want to, on a bilateral basis with that authority. It is in law now.

The United States, through section 407, could offer cooperative bilateral arrangements with its nuclear trading partners to do environmental assessments of nuclear operations and develop contingency plans in the event of nuclear accidents. Section 407 also provides a basis for negotiating a complete, a mandatory incident reporting system with all of our nuclear trading partners.

Once such an arrangement has been established bilaterally, extension to an international system could then be accomplished more readily. I think now that the Soviets have had their attention centered on this, hopefully, we can include the Soviets in any future organization or international reporting system.

I intend to listen very carefully to the testimony today, question our witnesses about these and other issues in the area of nuclear safety, Mr. Chairman.

Thank you, again, for your foresight in calling these hearings. It is an opportunity for us to really start moving in this area now that the world's attention has been focused on the accident at Chernobyl.

Thank you very much.

Senator COCHRAN. Thank you, Senator. We would like now to have our panel from the General Accounting Office come forward. Included in this panel is Mr. Allan Mendelowitz, Mr. Tom Flaherty, Mr. Keith Fultz, and Mr. Dwayne Weigel.

Again, let me express the appreciation of the subcommittee to you for your assistance in the preparation for the hearing, providing the committee with a written statement in advance.

We request that you make your presentation and then we will have an opportunity to discuss your remarks and the GAO report. Mr. Mendelowitz is the Associate Director of the National Security and International Affairs Division of the GAO.

TESTIMONY OF ALLAN I. MENDELOWITZ, ASSOCIATE DIRECTOR, NATIONAL SECURITY AND INTERNATIONAL AFFAIRS DIVISION, GENERAL ACCOUNTING OFFICE, ACCOMPANIED BY TOM FLAHERTY, SENIOR EVALUATOR, NATIONAL SECURITY AND INTERNATIONAL AFFAIRS DIVISION; KEITH FULTZ, ASSOCIATE DIRECTOR, RESOURCES, COMMUNITY, AND ECONOMIC DEVELOPMENT, AND DWAYNE WEIGEL, GROUP DIRECTOR, RESOURCES, COMMUNITY, AND ECONOMIC DEVELOPMENT DIVISION

Mr. MENDELOWITZ. Thank you, Mr. Chairman. I see the name plates are up. I was going to introduce my colleagues, but I think your gracious introduction and the name plates should solve the problem.

I am pleased to be here today to discuss with your our work on international nuclear power reactor safety matters. In September 1985, as you know, we completed a review of the activities of the United States and international organizations to help prevent or mitigate the consequences of a nuclear powerplant accident.

Objectives of our review included providing information on nuclear safety problems in other countries; determining the status of

international effects to address these problems; determining the extent to which information on nuclear accidents is being accumulated and shared internationally, and examining efforts to establish a framework for an international response to a nuclear accident.

Our comments today are based on the results of that review. As of September 1985, there was a worldwide total of 537 nuclear powerplants either operating, under construction, or on order; 408 of these were outside the United States. With the completion of nuclear plans already under construction or on order, 33 countries, including 17 developing countries, will be operating nuclear power reactors. The International Atomic Energy Agency projects that by the year 2000, slightly more than half of the countries with nuclear powerplants will be developing countries. As IAEA observed, many of these developing countries have little or no prior experience in operating nuclear powerplants nor technical resources adequate for supporting effective, independent nuclear safety programs.

The growth in the use of nuclear power internationally over the past 25 years has heightened concern as to the need to ensure the health and safety of the general public as well as persons working directly with the technology. As we reported in September, the greatest danger from a nuclear accident is the release of significant amounts of radioactive material into the environment.

While IAEA views the overall nuclear safety record over the years as generally good, the accident at Three Mile Island focused worldwide attention on the question of nuclear safety. And last week's accident at Chernobyl, which had much more serious consequences than the accident at Three Mile Island, underscores the need for increased international cooperation to cope with the nuclear power safety problems.

The statement this week by the heads of government at the Tokyo Economic Summit explicitly recognizes this need.

According to IAEA and U.S. Government officials, the responsibility for nuclear safety rests with the individual countries that operate nuclear powerplants. However, to help these countries with their responsibilities, IAEA, the Nuclear Energy Agency of the OECD, and the U.S. Nuclear Regulatory Commission have undertaken programs designed to strengthen the safety of the nuclear power systems.

Through the IAEA and/or NEA, efforts have been initiated to develop safety standards or guidelines, exchange information, conduct research, and provide training and expert assistance to help improve nuclear safety. The NRC also has negotiated bilateral nuclear arrangement with some 21 countries.

The NRC collects information on safety-related operating incidents at foreign nuclear powerplants from a number of sources. However, it informed us that it relies primarily on the NEA and IAEA incident reporting systems and on information shared under bilateral nuclear safety agreements.

Our review of NRC information shows that from 1971 to August 1984, there were data on 2 significant and 149 potentially significant incidents at foreign nuclear power reactors, not including the Soviet bloc, for which there was no information.

According to NRC, a significant incident would include:

One, a significant release of or exposure to radioactive material;

Two, significant degradation of safety-related systems;

Three, significant deficiencies in design, construction, operation or safety evaluation;

Four, significant generic problems; and

Five, significant consequential actions.

A potentially significant incident refers to an event which had no significant effects on a plant or the public but requires further engineering analysis to determine if it has safety implications for U.S. reactors. Attachment 1 lists the reactor systems in which these incidents occurred. Until earlier this week, when the NRC authorized its release, this information was not available to the public.

[The attachment referred to follows:]

ATTACHMENT 1.—*Systems in nuclear power reactors in other countries with significant or potentially significant safety incidents since 1971*

	Number of occurrences
Main steam supply systems	22
Coolant recirculation systems and support	22
Reactivity control systems	[1] 17
On and/or off-site power systems	14
Emergency core cooling systems	[1] 13
Residual heat removal systems	11
Condenser and feedwater systems	10
Reactor vessel integrity and operability	8
Emergency generator systems	7
Reactor core systems	5
Containment systems and control	5
Spent fuel and waste management systems	7
Turbine generator systems	4
Fuel handling systems	2
Other	4
Total	151

[1] Includes one "significant" safety incident.

Source.—Compiled from NRC's Foreign Event File.

Mr. MENDELOWITZ. Countries operating nuclear powerplants have become increasingly aware of the value of sharing operating safety data and experience to help prevent accidents. If reactor operators are aware of incidents that have occurred elsewhere, abnormal events may be avoided or their severity mitigated.

As of June 1984, operators in about 300 nuclear powerplants worldwide have accumulated over 3,100 years of reactor experience. According to IAEA, this experience is valuable for recognizing the causes of accidents and the methods for avoiding or dealing with them.

The extent to which nuclear accidents might be avoided or their effects mitigated through the international sharing of reactor experience probably cannot be measured.

However, the potential value of such data sharing is widely accepted. After the Three Mile Island accident, U.S. officials learned that similar incidents had occurred at nuclear plants in Switzerland in 1974 and Ohio in 1977. But the operational experience gained from them was not readily available for use at Three Mile Island. In both cases, the problems were solved before serious damage was done. Information on the Ohio experience was provid-

ed to the NRC, but was not known to the operators of Three Mile Island.

The United States participates in bilateral and NEA incident reporting efforts, but at the time of the completion of our audit work, it was reluctant to agree to participate directly with the IAEA system because of perceived problems of duplication with the NEA system and the lack of meaningful participation by the Soviet Union.

While there may be some duplication in the sharing of information, the IAEA system includes a large number of countries that are not in the NEA system. The United States has since agreed to join and participate in the IAEA system. We believe that, in view of the serious accident at Chernobyl, full participation by all nations that have nuclear power programs would maximize the benefits of the incident reporting system.

Sharing such information, if the United States can acquire more information on Soviet reactors, is of special importance in view of the Soviet construction of two large nuclear power reactors in Cuba.

Needless to say, if there were a serious or significant incident in those reactors in Cuba, the United States is close enough to represent an area that would potentially suffer damage.

I will turn now to the subject of establishing a framework for an international response to nuclear accidents. During our review, we found that problems resulting from a serious nuclear accident may be beyond the response capability of many countries and may require assistance from other countries. The kinds and level of resources required to respond to a major accident was dramatically demonstrated at Three Mile Island. Substantial technical support and major commitments of resources were required on short notice to deal with the operational problems at the crippled reactor; to implement the plan for reactor cooldown; to manage the radioactive waste problem and so on.

The number of onsite technical support people grew from 10 to almost 2,000 within 2 weeks. The complexity of the problem is further revealed by last week's accident at Chernobyl.

According to the IAEA, many countries would not have sufficient technical personnel to handle such an accident. In case of a smaller accident abroad, the U.S. Government has identified the type of technical assistance that national governments might request from the United States.

There are, however, a number of obstacles which the State Department believes would impede the timely and effective provision of external assistance. They include: one, the issue of liability; two, the legal status of the assisting party; three, the question of who controls and directs the assisting personnel; and four, the question of who bears the costs incurred by the assisting party.

These problems should best be resolved in advance, and the State Department has indicated that it is possible to do so, thereby overcoming these impediments to providing assistance. In 1981, the United States initiated action to negotiate an international convention setting forth the legal terms and arrangements that would apply to the provision of emergency assistance by one country to another in the event of a major nuclear accident.

Some European nations expressed concern as to whether such a convention was needed. Some countries have been concerned about the issue of contingent liabilities being an infringement on their sovereignty, and some about the length of time and effort it would take to negotiate and ratify such a convention.

Instead, at the direction of the IAEA Board of Governors, an IAEA experts' panel reviewed the issue and agreement was reached that a reference document be prepared with a single set of provisions setting forth the terms and conditions that could be applied to emergency assistance. The panel believed this document could serve as a model for negotiating bilateral or regional agreements and as a basis for agreement between a requesting and an assisting nation at the time of a nuclear emergency.

In January 1984, the IAEA published a set of "Guidelines For Mutual Assistance Arrangements In Connection With Nuclear Accidents." The guidelines apply to a situation where one country asks for help from another country or countries. No country is required to request, accept, offer or provide assistance by reason of the acceptance or use of the guidelines.

In other words, the guidelines are informational and not binding on any country. As a result, there is still a gap. Despite past foreign opposition to an international convention on emergency assistance, other countries may be reevaluating their positions in light of the Chernobyl accident. Consequently, the subject might usefully be raised again by the United States.

Mr. Chairman, this concludes my prepared statement, and we would be happy to try to respond to any questions you or Senator Glenn may have.

Senator COCHRAN. Thank you very much, Mr. Mendelowitz.

The findings that GAO made, as I understand them, with respect to incidents or occurrences at nuclear powerplants fell into two groups that are described in your statement. One was a group of significant incidents, and another group was potentially significant incidents. Is that correct?

Mr. MENDELOWITZ. Essentially, that is correct. Those were the top categories. There were other incidents, of course, that fell into the category that represented essentially no significance at all.

Senator COCHRAN. No significant incidents, incidents which were not significant at all?

Mr. MENDELOWITZ. Incidents on which information was collected, were viewed and evaluated, and determined to have no significance to the safe operation of the reactors.

Senator COCHRAN. Of those which were considered to have some significance, as I understand your statement, there were two groups: One which you considered, in your words, to be significant; others which you considered to be potentially significant; is that correct?

Mr. MENDELOWITZ. That is correct, sir. The categorization, though, of significant and potentially significant is the designation provided by the Nuclear Regulatory Commission, and the breakdown of the incidents as between significant and potentially significant and the definitions as to what significant and potentially significant are, are in fact, NRC definitions.

Senator COCHRAN. Do you have any basis on which to disagree with the definitions that were made available by the Nuclear Regulatory Commission?

Mr. MENDELOWITZ. I think that the issue of what is significant and what is potentially significant, is a very complex, technical judgment and would not be the type of judgment call that the General Accounting Office would generally make. Because of that, what we did was we took the NRC data that was sitting in the files, data that, in fact, had never been aggregated and we totaled it up. We looked at within a table format in terms of the number of incidents and where they fell, and we were able in this way to get a handle on the extent to which the information was available in the files on this type of problem and its severity.

But I think that making an independent judgment on all these matters would probably be far beyond our technical capability. We would have to, then, organize a panel of nuclear engineers and experts; review the substantive material, and then what we would have would just be our judgment call from our panel of experts in comparison with the NRC's judgment call.

Senator COCHRAN. You didn't undertake to make an international review or investigation of incidents to determine whether they were significant or potentially significant, did you?

Mr. MENDELOWITZ. We accepted the NRC's determination of the level of significance; that is correct.

Senator COCHRAN. Therefore, the answer to my question is no.

Mr. MENDELOWITZ. Correct.

Senator COCHRAN. In determining how to categorize these incidents, you didn't make any independent judgment, and you didn't endeavor to assess the correctness or accuracy of the Nuclear Regulatory Commission's findings?

Mr. MENDELOWITZ. Correct.

Senator COCHRAN. Therefore, the report that you have made available indicates that there were basically 151 incidents which you found described in the Nuclear Regulatory Commission files. Two of those were considered by the NRC to be significant incidents, and 149 of potentially significant; is that correct?

Mr. MENDELOWITZ. That is correct.

Senator COCHRAN. In your review, you also looked at the information sharing and how this was done; whether there was a framework for it, did you not?

Mr. MENDELOWITZ. Correct.

Senator COCHRAN. As I review the statement that you have made, you found that there are two organizations internationally: The International Atomic Energy Agency, and the Nuclear Energy Agency which, to some extent, provide information sharing, exchange of technical know-how and offers of assistance in case of international accidents and that kind of thing; is that correct?

These are two main international agencies involved in nuclear safety and nuclear powerplant operations.

Mr. MENDELOWITZ. Correct.

Senator COCHRAN. But isn't it correct that the NRC also has some bilateral relationships with countries operating nuclear plants throughout the world?

Mr. MENDELOWITZ. Yes.

Senator COCHRAN. Did you make any assessment as to whether or not these are working; whether or not these international agencies are doing the things in practice that the charter or the authority they have says that they can do? Did you make any assessment of that?

Mr. MENDELOWITZ. I would say that the information we provided is primarily descriptive and was not an evaluative judgment in the sense that we had no basis for determining whether information shared, for example, under NEA or IAEA systems represented all information or partial information.

Senator COCHRAN. But you did find that the extent, according to your statement, to which nuclear accidents might be avoided or their effects mitigated through the international sharing of reactor experience probably cannot be measured.

That doesn't mean that it wouldn't have any value.

Mr. MENDELOWITZ. No. no. I think you are quite correct. Our assessment is that the sharing of operating experience, incidents, and design problems that develop should be considered a very important step in the improvement of nuclear safety, because the experience at one facility can be analyzed carefully, evaluated against the design and the operating procedures in other facilities, and to the extent to which its relevance is determined and its significance is determined, improvements can be made to strengthen the safe operation of nuclear plants.

There is no calculus for putting a dollar value or a risk value on the sharing of information. You can't say if you share this information we are able to reduce the risk of an accident by a certain percent or a certain fraction of a percent.

But I think what we found is there is universal acceptance of the notion that the sharing of information is an important contribution to improving the safety of nuclear power reactors.

Senator COCHRAN. In that connection, I was disturbed, frankly, by your finding that after Three Mile Island had occurred, it was learned that there were similar experiences in Switzerland and in the State of Ohio at a nuclear powerplant and that this information hadn't been made available to the operators at Three Mile Island.

I wonder, in your findings, did you come across any kind of similar revelation about the events over the past 20 years, and whether or not the Russians could have learned something at Chernobyl that they could have used to help mitigate the damage or to deal with the accident in a more effective way?

Mr. MENDELOWITZ. The problem with applying it to Chernobyl, of course, is that we just don't have a basis to answer the question in the context of the Chernobyl accident.

But we did find other examples of where similar types of accidents had cross applications. For example, in the midseventies, we had an accident at the Brown's Ferry plant in Alabama, in which there was a fire in the electrical cables that control the apparatus of the safety systems. What we learned in the course of our review was that the Soviets reported some years later to the IAEA that they had a similar type of fire in electrical cables in a plant in Armenia.

Even though the Soviet reactors are different from our reactors, even though we don't know much about their design and operations, it is clear that we have an example of an event in the Soviet Union and an example of an event in the United States, both of which had potentially serious consequences, and both involving the same types of systems, namely, electrical cables controlling safety systems.

We believe that this example represents a type of accident which demonstrates the potential for sharing even between the United States and the Soviet Union.

Senator COCHRAN. Do you know whether or not there was any sharing of information with IAEA member nations or members of even the Nuclear Energy Agency of information from that Alabama incident?

Mr. MENDELOWITZ. We don't know specifically. One of the things we ought to point out, though, is that within the United States we have an open society, and a lot of events that take place in this country make it into the public record. The Brown's Ferry incident was discussed extensively on the front page of the Wall Street Journal, I remember after it occurred.

While we are not going to specifically call it a formal sharing, it is clear that the incident at Brown's Ferry was in the public record.

Senator COCHRAN. There has been some suggestion from leaders at the Tokyo summit that we need to move beyond just a set of standards under the auspices of IAEA to a more formal convention that would provide for information sharing and the providing of assistance among nations to try to deal with problems arising from nuclear powerplant accidents.

What is your judgment along those lines? Is that something that the United States should now move quickly to try to push? Should we instigate discussions to try to reach such a convention?

Mr. MENDELOWITZ. We believe, in light of the Chernobyl accident, that the basis of foreign opposition to such convention may, in fact, be under reconsideration, and it seems to be, from our perspective, a propitious time to raise the issue of a convention.

Senator COCHRAN. As a matter of fact, the United States has been pushing for that kind of thing for awhile; isn't that correct?

Mr. MENDELOWITZ. That is right. The United States began in 1981 to push for such a convention. Because of opposition from a number of other countries, the convention initiative, essentially, was ended, and in its place, we came up with the IEA's nonbinding guidelines.

But I think that it would be hard to reject the conclusion that circumstances are changing as a result of Chernobyl, and the issue could usefully and might usefully be raised again.

Senator COCHRAN. Thank you very much. I have some other questions, but I think I will reserve them until later and permit other Senators to ask questions.

Senator Glenn?

Senator GLENN. Good. Thank you very much, Mr. Chairman.

First let me start out domestically here on this matter. We have the problem in Ohio, and you said TMI did not know about this, and the information was not passed, which indicates we need some

straightening out within our own borders. I gather you think that that is being corrected now; is that correct?

Mr. MENDELOWITZ. I think that there have been a lot of changes since Three Mile Island. The NEA incident reporting system, and the IAEA incident reporting system were all created in the aftermath of Three Mile Island. We specifically have done some work on implementing it.

Senator GLENN. How about the information here, right now, just our own protection here? We had an incident in Ohio. I gather some of that information could have been used in advance of TMI. It was not sent there or implemented there. Have we corrected those things, in you opinion?

Mr. MENDELOWITZ. I think Mr. Fultz can answer that.

Mr FULTZ. One thing DOE has done, sir, has created an Assistant Secretary for Energy, Safety, and Health. This was created in September 1985 as a result of some of the situations that you have described. So the Department has taken some actions which are getting at the fix which you are discussing.

Senator GLENN. Is it adequate now to make sure something learned at one plant will be immediately disseminated and put into whatever preventive measures are needed at another plant, or does it still need to be implemented more?

Mr. FULTZ. It is too premature for us to determine whether or not the changes that have been made are effective.

Senator GLENN. I have looked at this closely. Do you think we need to set up an agency for investigating as opposed to promoting? I am thinking of the FAA; those people have the National Transportation Safety Board which does accident investigations, a separate unit with separate investigations and separate investigators and so on quite apart from FAA. They make recommendations to FAA.

Do we need a similar thing where we split the investigations out from the NRC and keep them separate?

Mr. FULTZ. Over the years, the General Accounting Office has suggested to Congress that a policy consideration might be to establish an independent analysis of the kind you are describing.

Senator GLENN. You mentioned Cuba. Are the reactors that are going into Cuba, are those exactly the same as the one that was at Chernobyl?

Mr. FLAHERTY. Senator, I don't believe we know exactly what type they are. They are, as we understand it, of the standard Soviet 440 design. They are considerably behind schedule, and we believe some of the parts will actually be coming from Czechoslovakia.

But beyond that, we really don't know much about the attributes of those particular reactors.

Senator GLENN. Fine, we may want to look into that further. As far as you know, are they having containment vessels around them?

Mr. FLAHERTY. That is one of the critical questions we have. I have heard both sides, that they would have in their early designs, included that. Now, I have been told that if they hadn't been included, they certainly would be included now.

Senator GLENN. Let me ask some questions just for the record here, Mr. Mendelowitz, so we get this on the record here. Is it true

that there are no international agreements requiring nations to establish and maintain safety standards for nuclear plants?

Mr. MENDELOWITZ. Our understanding is there are no legally binding requirements.

Senator GLENN. Is it also true that there are no agreements requiring nations to allow international safety inspections of all their nuclear facilities?

Mr. MENDELOWITZ. I believe that is correct.

Senator GLENN. Is it also true that there are no international agreements requiring nations to inform the public and other nations about their nuclear plant accidents?

Mr. MENDELOWITZ. That is correct. The guidelines prepared by IAEA call for the sharing of this information and prompt notification in the event of an accident, but there is no legally binding requirement.

Senator GLENN. Is it also true that there are no international agreements requiring nations to seek or to receive international assistance in the case of nuclear emergencies?

Mr. MENDELOWITZ. That is correct.

Senator GLENN. Wouldn't this tend to indicate, in your opinion, the whole world is sort of skating along on thin ice as far as preventing or handling nuclear accidents is concerned?

Mr. MENDELOWITZ. As we have stated in our report, we believe that there are things that are being done internationally to improve nuclear safety. We believe that there is more that can be done.

Senator GLENN. In the numbers of "potentially significant incidents," that is in quotes there, because that is one of the categories that we have out of the report, can you give us some examples of what would constitute a potentially significant incident?

Mr. MENDELOWITZ. Examples of potentially significant incidents could include incidents such as a power failure, or blackout in a nuclear facility, leading to loss of power to the systems that operate the reactor.

Another example might be a rupture in a main steam pipe. Another example might be, for example, a valve malfunction that diluted boric acid in one of the ultimate safety systems.

Senator GLENN. Let me follow up on the chairman's questions a little earlier. It is my understanding that in the difference between significant and potentially significant, that potentially significant only meant if there was such an accident, wherever it occurred around the world, that it was going to have an effect on the United States no matter where else it occurred; is that correct?

Mr. MENDELOWITZ. I think to clarify a significant event, I think we provided several different examples. If there were a release of radiation that affected plant operators, even if it did not go beyond the plant, that would be viewed as a significant incident.

Senator GLENN. On the incidents, the way they are reported, I know that that part of the report is still classified, but these categories are not classified; I mean the number of incidents and where they occurred are still classified; we are not releasing that, but the types of things that are rated in the report, as I understood, we said if it was a potentially significant incident that applied to the impact that it would have on the United States.

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Theoretically, the Chernobyl incident, unless we got radiation in this country, that could theoretically be listed as only potentially dangerous, even though to the Soviet Union, it is devastating, and it is absolutely significant to the nations closer to them.

Is that the way the categories are worked out?

Mr. MENDELOWITZ. I have to say, to be totally consistent in how we do our work, I think we have to reserve our own judgment as to what Chernobyl was, but I think it is quite clear that due to the substantial amount of radiation released in the Chernobyl accident, because of the obvious degradation of the safety systems associated with the core meltdown at Chernobyl, there is no question that the Chernobyl accident would be classified as significant and not potentially significant.

Senator GLENN. If you take the definitions that I have mentioned here, as I understood that the definitions of those potentially significant and significant, were as such, different categories, it would seem to me that there are many hundreds of the incidents, perhaps even in the thousands, that might be reclassified to very significant incidents in the country in which they occur; is that correct?

Mr. MENDELOWITZ. I don't think that would be the case, because I think as we understand the basis for categorizing an incident, any incident that involves, in and of itself, a significant effect on a plant and its safety operations and any incident that would involve a release of radiation into the environment would be classified clearly as significant.

But a potentially significant incident, as we understand it, is one in which an event took place which represents a clearly unplanned and undesired event, such as a blackout of the electrical systems that operate safety systems; or such as the rupture of a main steampipe. However, because of the safety margins built into plants, because there are backup systems, because there are redundant systems, the incident itself did not result in a substantial degradation of the safety of the plant at that moment in time, did not result in the release of radiation or exposure to radiation on the part of either workers or the environment and public at large. But, because it has the potential of affecting safe operations, it requires careful analysis to see if, in fact, it is something that warrants changes in operating procedures or changes in design.

Senator GLENN. I think I can summarize by saying the work you people have done certainly points up the fact that we have a big problem on our hands, and we could keep on all day with details of how we classify different things and so on.

I think with what is going on, we know that we have a major problems, and we have established that without any doubt. Chernobyl has established that.

My time on this round is up. Next round, I want to get into some opinions of what you think we can do about these things from your vantage points.

My time is up, Senator.

Senator COCHRAN. Thank you.

Senator Cohen.

OPENING STATEMENT OF SENATOR COHEN

Senator COHEN. Thank you, Mr. Chairman. Mr. Mendelowitz, I was interested in the Soviet reaction to the incident. One of their spokesmen went on the television the following morning in response to a question involving the issues of international safety and warning and alerting other countries. He said the reactor accident was comparable to the shuttle disaster in the United States; in essence, "This is none of your business. This is a local matter."

The Soviets tend to take that view on most issues.

It struck me that the United States and the Western World should take the lead and sort of raise high the roof beam in expressing not only its outrage but its concern about the lack of the kind of standards to which Senator Glenn was just referring.

He asked you a series of questions to which you gave a rather qualified answer, saying, "Well, there is something being done, but it is not as well as it should be."

It seemed to me that it would be in our interest, and the rest of the world's, for that matter, to really take this issue and try to get some standards such as those adopted in the convention the chairman mentioned.

What about a convention? We had a concern a decade ago, about the physical safety of nuclear materials. We were concerned about the transportation of nuclear materials; we were concerned about the theft of nuclear materials; we were concerned about nuclear terrorism, and so we adopted a convention back in 1980. I believe it is called the Convention on the Physical Protection of Nuclear Material of 1980.

It has certain standards, one of which requires notification to other nations in the event of the theft of nuclear materials or the credible threat thereof. It seems to me we could use language such as that in talking about a radiation release or a credible threat thereof to other nations.

I am particularly concerned about an article that I read in yesterday's New York Times that reported that Swedish scientists now believe that since 1983 there have been at least three prior serious Soviet nuclear incidents they had detected, unreported by the Soviet Union, perhaps even involving meltdowns.

It seems to me that if we had such a convention in place that had the force of law, Soviet notification of those three prior incidents—if, in fact, they are real—might have caused the Soviet Union to take some measure with respect to safety precautions on Chernobyl.

So I think we ought to take this particular incident and try to get some standardization. I would apply it even to the design and construction and the operation of reactors. There is absolutely no justification, it seems to me, for any country to claim this is a local matter. Any time a nuclear reactor can be involved in an incident affecting other countries, it is no longer a local matter; it is an international matter. We ought to be taking the lead, it seems to me, to try to push for a convention in this field, as suggested by the chairman.

I also would like to ask a question concerning nuclear waste disposal. It is an issue of some concern to the State of Maine, as you

know. There is a proposal that has Maine as a potential site for a nuclear waste dump. It has generated, as you might anticipate, quite a bit of outrage. Since the Vietnam war I have never seen an issue that has so galvanized the people of my State as this issue has.

China reportedly has offered to store other nation's high-level nuclear waste for a fee. While this has not set off a stampede to explore this particular offer, nuclear proliferation issues have been raised.

It seems to me we haven't focused very much on the potential safety implications of China serving as a disposal for other nation's high-level nuclear waste.

The question would be, could nuclear waste storage accidents have international consequences or implications?

Mr. FULTZ. In the area of transportation, I think that is a very real possibility, sir. How you would get the wastes from here to any location does pose problems.

Senator COHEN. With respect to the storage and location of these waste dumps, wouldn't that have some potential of international implication?

Mr. FULTZ. It could have, yes.

Senator COHEN. Are we a party to any international agreements that either address directly or indirectly the environmental effects of nuclear waste storage?

Mr. FULTZ. To the best of my knowledge, we are not.

Senator COHEN. Don't we have a treaty with Canada in which we agree not to undertake projects that might possible have environmental consequences?

Mr. FULTZ. We have no idea, Senator.

Senator COHEN. You don't have any idea.

Mr. FULTZ. If there is an international agreement.

Senator COHEN. There is, in fact, a treaty, a 1909 treaty with Canada that establishes that precedent. We must have other bilateral agreements, as well.

But it seems to me we also have to be thinking in terms of the storage of nuclear waste as well as nuclear reactors. It does have international implications and consequences.

Mr. FULTZ. We do have two reviews underway, sir, which address the issue of storage of nuclear waste. One is the monitored retrievable storage facility that has been suggested by DOE to be in Tennessee, and one is looking at the first repository, which is supposed to be in existence in 1998.

Just last week, we received a request from Chairman Markey from the House to review the proposal of the second repository for storing high-level nuclear waste, which you mentioned in your opening remarks.

Senator COHEN. Mr. Mendelowitz, could we come back to the question of whether the United States should try to take the lead to come up with some standards for the construction, operation, and design of reactors as well as a convention requiring notification of a credible threat of release of radiation in the atmosphere?

Mr. MENDELOWITZ. I think it is clear from our statement and from our report, we view a convention as a desirable way to go.

There are obvious difficulties in negotiating, and realizing it, but I think what makes the nuclear power industry unique is that we cannot contain, in one country, the adverse consequences of a nuclear accident. The consequences of an accident respect no national boundaries, and because the consequences of an accident respect no national boundaries, ther a convention that lays out the legal obligations to notify, take precautions, et cetera, seems to be an appropriate and called for step.

Senator COHEN. Should that not be extended to encompass the design, construction, and operation of reactors, as well?

Mr. MENDELOWITZ. To be honest, I don't have sufficient familiarity with the details of how that would be negotiated, but clearly——

Senator COHEN. I don't want the details.

Mr. MENDELOWITZ [continuing]. Clearly, the safe operation and safe design must clearly be part of any convention, because to reach agreements on legal liability and responsibilities in the event of an accident, does nothing to mitigate the consequences if one takes place. So getting more than advance notice to get people to take shelter if prevailing winds go the wrong direction clearly is an appropriate issue to put on the agenda.

Senator COHEN. Are we doing enough to take the lead in this field now?

Mr. MENDELOWITZ. Do I think that are we doing enough? I think that we took an important initiative in 1981. In a sense, we bent our spear taking that initiative, and made little progress other than nonbinding agreements or guidelines.

I think that it is clear that the Chernobyl accident has changed the game, and as we observed in the statement, we think the time is appropriate to take another initiative in this area. I think that the recognition of the Prime Ministers and Presidents attending the Tokyo Economic Summit that at a minimum, a convention dealing with responsibilities regarding notification, et cetera, should be on the agenda is a step in this direction.

Senator COHEN. I would hope you would take into account in those two studies being done now what consequences nuclear waste storage has for international safety.

Mr. FULTZ. Yes, Senator.

Senator COHEN. I have nothing else, Mr. Chairman.

Senator COCHRAN. Thank you, Senator.

One thing I think is clear, so far in the hearing, is the incident reporting system is defective, and we need to turn our attention to correcting that problem. If incidents have occurred, whether they are potentially significant, significant, or whether they are tantamount to being described as an accident, they ought to be known about. We ought to have knowledge of these incidents so we can learn from them, as I see it, not just internationally, but nationally, as well as internationally. There have been breakdowns in the system.

Do you have any recommendations for the development of a system that would work?

Mr. MENDELOWITZ. You are asking, I think, the most difficult question with respect to international agreements, and that is, how do you take sovereign nations, who jealously guard their sovereign

prerogatives, and impose upon them international obligations that are legally binding?

Well, clearly you can't impose such obligations. They have to be willingly accepted and committed to by the contracting parties, and I think that therein lies the nub of the issue.

Such a convention can and will be successful if the major powers determine that it is in everyone's mutual interest to do this, and from our perspective, we can only hope that the Chernobyl accident will serve as the impetus for that assessment on the part of the major nuclear powers.

If, for example, the United States, France, and the Soviet Union, which are major exporters of nuclear reactors, were to take seriously such legal obligations as would be part of such a convention and make arrangements associated with the sale of reactors that ensured participation in the convention by the purchasing countries, we would probably be a long way toward realizing an effective convention.

But the key is, it is not something that can be imposed. Each of the sovereign nations, the Soviet Union, especially, which, as we know, is a very closed society, has to determine that it is in its interests to fully participate, and we can only hope that the severity of this accident will lead them to that conclusion.

Senator COCHRAN. I think it is encouraging that we have seen the Soviets inviting Mr. Hans Blix, who is Director of the IAEA, along with two physicists, one, a Soviet physicist, one from the United States, to discuss the incident at Chernobyl.

It will be interesting to have the benefit of whatever report may be forthcoming as a result of that visit and whatever inspections they are able to undertake.

That is encouraging to me. Do you find comfort in the fact that the Soviet Union, under whatever pressures exist for them to do so, are at least indicating a recognition of the value of the International Atomic Energy Agency through that invitation?

Mr. MENDELOWITZ. Mr. Chairman, our problem with commenting on specific Soviet responses at this time is that all we have to go on are newspaper articles, and I would be reluctant to make judgments about appropriate or inappropriate behavior based upon newspaper articles, which we, of course, haven't had the opportunity to look behind, collect information on and assess in depth.

I think on the surface, personally, I view that as positive. The extent to which, for example, the newspaper reports were correct when they said that the Soviets had to turn to certain Western nations to ask for assistance, to the extent that that is correct, that represents, in real time, a recognition on the part of the Soviets that, they may be dealing with problems that they can't handle in secret and on their own.

Senator COCHRAN. Senator Glenn.

Senator GLENN. Thank you, Mr. Chairman.

I guess because we have been dealing with this thing for such a long time we begin to feel like Paul Revere that nobody is paying attention after awhile. We begin to get impatient about things. I guess I think if our people wanted to move, we should be able to move, because we have section 407 under the NNPA that deals with bilateral arrangements on nuclear safety.

I think if we are waiting for a great conclave to come together and come together with some big, nice agreement, we are wishing, and hoping, and hoping for something that is not likely to happen very soon.

I think we could move and move now and use our bilateral authorities in that section 407, to go ahead and start moving in this area and encourage other suppliers of which, fortunately, there are still a limited number around the world.

It is a little more than you can number on one hand, but not too much more than that, the number of major nuclear suppliers, and we should try to get these agreements agreed to now on a bilateral basis. If we can get enough of them, with ourselves and our allies, maybe we can forestall some of the difficulties, at least with the developing countries. Because as a lot of these plants go into developing countries, where there is not the technical background or expertise in nuclear matters, that is where we are going to really run into problems, between now and the year 2000, if we are not very, very careful.

We have been fortunate that most of the plants now, it seems to me, have gone into places where there was some expertise, and we have had our TMI and the difficulty in Ohio you mentioned awhile ago; they have got Chernobyl over there that was far worse, of course. Those events are with countries that know what they are doing.

What is going to happen when we get into the lesser developed countries? It seems to me we should start making these agreements right now. Don't wait for some big international conclave 5 years from now that we have put together.

I guesss that is more a statement than a question. I will just follow it up. Do you agree or not?

Mr. MENDELOWITZ. I think that we see absolutely no inconsistency between taking bilateral and multilateral initiatives in this area. I think that where we have leverage to make progress bilaterally through strengthening bilateral agreements with countries that depend on us for nuclear technology and assistance, it is a good way to go.

To the extent to which the bilateral approach—it would be very difficult to undertake bilateral approaches with every country in the world—to the extent to which the bilateral approach supports an effort to come up with a binding convention, I think both approaches achieve the same end.

Senator GLENN. I was interested the other day; we were going back through the files and dug up one here that was published in the Washington Star back some years ago, John Fialka's article back here in October 1978, a little headline on it that says, "Soviets Think They Have Solved Atom Safety Problem." [1]

It shows how wrong you can be.

Valeri Velikhov, deputy director of one of their institutes there, Kurchatov Institute of Atomic Energy, is saying why they didn't put containment buildings around. "There is no containment," he says, "Because we are developing an engineering solution together

[1] See p. 68.

that will make loss of cooling accidents impossible. The new stations will operate at very low pressures and be able to contain radioactive material within the containment if an accident occurs."

They supposedly know what they are doing, and what is going to happen when we get this off into developing countries where they don't have the expertise the Soviets have and where some of their plants—I don't know whether they are going to have containment vessels or not, the ones in Cuba, for instance. I think the indications are that out of Chernobyl that these things blow and flow across international borders.

We have got to get going with some kind of bilateral or international agreements of some kind. I would think that the administration would want to make that one of their highest priorities.

Did you look into production reactors as opposed to power reactors?

Mr. MENDELOWITZ. This project dealt exclusively with power reactors.

Senator GLENN. Is it your understanding at Chernobyl that they use their electric-generating capacity over there also as production reactors and that is one of the reasons they use the graphite core; is that correct?

Mr. MENDELOWITZ. We have heard that same observation, but we have no independent confirmation. We just don't know.

Senator GLENN. Do you think IAEA is capable of expanding into being the monitoring agent or being the establishment agent for standards for the world and should monitor those in addition to their safeguards role that they perform now? Or should it be a different agency?

I guess that is the question. Should IAEA do that, expand into this area of safety monitoring or should we let them continue with their safeguards role on diversion of material and go to a new agency of some kind for what we are trying to do here?

Mr. MENDELOWITZ. I think that the ability of any international organization to be effective is really a function of the extent to which the participating countries want that agency to be effective. IAEA seems to have a pretty good record on safeguards because there was consensus that there was something that needed to be done.

If there is a consensus on the part of the participating countries, particularly the major powers in terms of the participating countries.

Senator GLENN. Do you think IAEA is being too timid in this area?

Mr. MENDELOWITZ. I think IAEA has done as much as its members would permit it to do. I think when you deal with an international organization, to assume that it has a life into itself, I think, is expecting too much.

Senator GLENN. They are under some difficulties, I know, and Dr. Blix has been here a number of times, and we meet with him on a regular basis. In reviewing some of their recommendations and so on, they are being rather timid.

Perhaps they are doing about all they can do with their constituency; I will put it that way.

Mr. FLAHERTY. Senator, there are important tradeoff considerations. I think the Director General has to take into mind, when he takes any position, the two superpowers, the Russians and the United States. I think you have to find accommodation between the two of them.

I think in any international organization, you basically function with the lowest common denominator, that which is acceptable to all. I think that is part of the problem.

Another problem I foresee is the continued competition among nuclear suppliers for business in the developing world. I think that is one of the considerations, and I think that certainly influences the actions of the IAEA.

Senator GLENN. That is the reason; this developing business in the developing countries of the world is the reason why I think this is so timely and so urgent right now.

We are just on the verge of that expansion into the developing world that is going to have to leave us less protected unless we do some things right now, as I see it, and that is a question of whether IAEA can handle that thing if we really got behind them and put some money in there and some people and expanded their authority, perhaps, through the United Nations and all that business, or do we need to go to something new and different and let them stick with the safeguards?

Mr. MENDELOWITZ. Following up on what Mr. Flaherty said, this issue of competition between suppliers is, I think, one important reason why we should be proceeding on both the bilateral and the convention tracks. If you have a binding convention, then issues of safety, responsibilities, and modifying sovereignty in the area of nuclear safety does not become something that becomes a point of competitive negotiations between buyers and the seller.

Senator GLENN. We have a couple of examples. I won't have time to read them right now. I may put them in the record later. They have been very timid in some of these areas as far as applying their own standards, as far as asking other people to even come up to those same standards.

One of their papers that was printed in January 1985, one of their guidelines, as you referred to earlier, concerned reportable events, integrated planning, and information exchange in the transboundary release of radiocative materials. In this guideline, it is stated that if a nuclear event nearby, the implementation of actions resulting from notification: "Should not normally lead to protective measures being produced in the neighboring states at an earlier stage or being more stringent than in the state in which the accident has occurred or is occurring."

Now I read that to mean the IAEA would not even be pushing to have the Poles pass out potassum iodide to their people if the Soviets had not taken action in their own area around Chernobyl. That is pretty timid, it seems to me.

We took exactly the opposite position at Three Mile Island. We want to protect people more than anything else. Over there, they want to protect the state first and the state reputation, and the people secondarily. It really shows the difference between our systems, it seems to me.

There are some other examples where it shows the IAEA as being very timid. I hope they could be developed into an agency to really take the lead in this in developing the standards and work with us in developing the standards and with the other supplier nations and let them expand into an agency that really could do this job. We have got it built. If we didn't have IAEA, we would probably have to invent it. Let's expand it and make it workable instead of making it a timid agency that we have trouble getting a few bucks for once in awhile to hold this very thin redline they have got there. Thank you.

Senator COCHRAN. Thank you, Senator Glenn.

Senator Cohen, do you have other questions?

Senator COHEN. What is your personal opinion as to whether or not any agreement or convention should cover the military production reactors as well as the commercial facilities? Should it cover the military ractors, as well? If not, why not?

Mr. MENDELOWITZ. It is not an issue that we focused on in the course of the study, so——

Senator COHEN. I am not asking you about the study.

Mr. MENDELOWITZ. You are asking me my personal opinion. My guess is, and this is strictly a personal observation, that different countries have different levels of sensitivities. I would say that a weapons facility, a production facility represent, a much higher level of sensitivity than an electric-generating facility.

If we insisted upon including military-related reactors, we might be asking for too much. If we can make good progress in a convention, for example, with respect to the several hundred electric-power reactors, I would hate to see that sacrificed because of a concern about getting to the small number of military-related facilities.

Senator COHEN. There is no disagreement about the consequences from the meltdown of or an accident at a military reactor as compared to a commerical reactor; the consequences are deadly in either event.

Does the United States have a problem in maintaining this moral pitch for safety because of potential inadequacies with our own military reactors?

Mr. MENDELOWITZ. I just don't know.

Senator COHEN. You don't know? Let me tell you.

Mr. MENDELOWITZ. You are putting me in a somewhat different situation, Senator.

Senator COHEN. Let me raise the issue hypothetically. Is there a problem hypothetically that the U.S. military reactors might not meet the standards we set for others? Is that hypothetically possible?

Mr. FULTZ. We will be looking at that issue, but to the best of my knowledge, there is no reason why they could not.

Senator COHEN. To my knowledge, we have two major areas or facilities we use to produce nuclear material for our weapons systems. They are based upon 1950's technology. They are aging. One of the facilities at Savannah River was shut down because it was leaking tritium.

I am wondering whether we are even in a position to advocate strict standards for international agreements when we ourselves

haven't measured up to the safety requirements that might be necessary. A Department of Energy panel, for example, back in 1982, recommended that we build a new nuclear reactor to prodcue nuclear materials for the warheads for the MX, the Trident, the cruise missiles, and the other new strategic weapons systems that we have proposed to build. Yet we have rejected that because it is going to cost between $4 and $8 billion.

So we are going back to the old reactors where there are some deficiencies. Don't we have a problem in advocating strict standards for other countries when we are not there ourselves?

Mr. FULTZ. Last week, sir, we received a request from Senator Glenn to review the Savannah River reactor you are discussing. I believe the week before we received a request from Senator Hatfield to review the Hanford reactor, so we will be assessing these in the next couple of months.

Senator COHEN. I will withdraw my hypothetical questions.

Thank you.

Senator COCHRAN. Thank you, Senator.

Thank you very much for cooperating with our committee and assisting in our hearing today. We appreciate it very much.

Our next witnesses this morning are representatives of the Nuclear Regulatory Agency. We have with us this morning Mr. James R. Shea, who is the Director of the Office of International Programs and Mr. Clemens J. Heltemes, Jr., who is the Director of the Office of Analysis and Evaluation of Operational Data.

We welcome you to the subcommittee, and we thank you for preparing a statement in advance of the hearing. We have a copy of your statement, which we will make a part of the record. We ask you to make such summary comments as you see fit. You may proceed, Mr. Shea.

TESTIMONY OF JAMES R. SHEA, DIRECTOR, OFFICE OF INTERNATIONAL PROGRAMS, NUCLEAR REGULATORY AGENCY, ACCOMPANIED BY CLEMENS J. HELTEMES, JR., DIRECTOR, OFFICE OF ANALYSIS AND EVALUATION OF OPERATIONAL DATA

Mr. SHEA. Senator, thank you very much.

Since time is moving on, I will try to abbreviate the statement which you have for the record.[1] I am pleased to testify here today before you on NRC's international activities and the GAO report, which we have heard a good deal about this morning.

I would like to give you a brief overview of NRC's international cooperation activities and then comment on the GAO report itself.

One of the main functions in my Office of International Programs is international cooperation regarding public health and safety and environmental questions in the operation of nuclear power facilities. I will emphasize that here today.

For the last 12 years, NRC has been entering into formal, bilateral cooperation arrangements with a number of different countries to exchange information and to cooperate in nuclear safety. We now have arrangements with 21 countries plus Taiwan, and in an attachment to my statement, there is a list of these agreements

[1] See p. 31.

and the dates they entered into force that we will submit for the record.

These arrangements involve virtually all countries operating light water reactors of U.S. origin; all countries with reactors of U.S. design under construction; and several countries which, at some time in the past, have seriously considered acquiring U.S. nuclear power technology.

Here, we are mainly trying to establish a formal channel of communications with foreign regulatory organizations, so that we will notify each other promptly and completely of reactor safety problems that either affect our reactors or theirs, and also to look for what we might call precursor events that warrant further investigation, events that did not lead to a major accident, but give us a warning that something could happen, and we should study those further. A lot of the reactors abroad, of course, were designed by U.S. suppliers, so we are especially interested in those.

We also cooperate in certain other areas, such as environmental protection and safeguards, but our main focus is on nuclear power safety. We exchange information by quick phone notification, by letters, documents, in meetings, seminars and so on, and we can bring in people from the national laboratories as appropriate.

In many cases, the information is provided in confidence by these foreign countries, and so we protect it accordingly. This is the only way in which we will be able to receive it.

I might note in this regard that the NRC had exchanged visits with the Soviet authorities in the nuclear safety area back in 1978, and we were working at that time to develop a draft information exchange arrangement similar to those I have described with the other countries. But all of this ended in 1979 as part of the United States Government's protest against the Soviet incursion into Afghanistan.

This effort remained dormant until very recently, when the NRC approached the Soviets about the possibility of sending a delegation there to discuss nuclear safety and visit their nuclear facilities.

At the time of the Chernobyl accident, the request was awaiting a final Soviet response.

The accident itself has now focused a spotlight on the need for prompt notification of other countries of radioactive releases from reactor accidents and the importance of making full disclosure about causes and effects of such accidents as they become known.

I might say that we also have about 50 separate research agreements in which we cooperate with 14 countries in nuclear safety research projects in the United States and abroad, involving experiments sometimes in this country, sometimes broad, and a good deal of money is saved by cooperating countries through this cooperative effort.

Finally, NRC works closely with international organizations such as the International Atomic Energy Agency in Vienna and the OECD's Nuclear Energy Agency in Paris to implement their programs in the areas of health, safety, and environmental protection.

The aim of the NEA's work in nuclear safety, which we actively support, is to use the more than 3,000 years of reactor operating experience of its 23 members to better understand reactor oper-

ations under all conditions; to minimize hazards to workers and the public; to prevent accidents and to reduce their consequences.

So we have joined NEA's incident reporting system, which you have heard discussed earlier today. We work actively with them to provide information. As of August 1985, about the time the GAO report was published, the U.S. Government—the NRC is the main participant—joined the IAEA incident reporting system and provides its input to that agency via its NEA input.

That brings many countries of the world together periodically to discuss accidents that could lead to safety improvements in their countries.

But I should stress that this is not intended to function as an emergency reporting system during the course of an accident. The NEA and the IAEA systems are designed as an after-the-fact system for reviewing incidents to determine what lessons can be learned about them for nuclear safety.

We also participate with the IAEA in providing experts for visits to other countries to help them on safety and regulatory concerns. We in NRC provide staff members to lecture in IAEA training courses in the United States and overseas, and we regularly host foreign regulatory and safety personnel in long-term, on-the-job training assignments and course attendance in the United States under IAEA fellowships.

We have also helped the IAEA develop a whole set of nuclear power reactor safety standards and guides. I have a couple of those here today, just to show you what they are like. You could review those later, if interested. They are general standards that, in some areas, are fairly detailed, that provide a set of codes and standards and guides for people to use throughout the world. So there is an existing international set of safety standards that has been much talked about this morning. We do have a base at least to start from if there is interest in pursuing that further.

Now, Mr. Chairman, as the above testimony indicates, the NRC has an extensive international cooperative effort in information exchange, joint research, standards development, incident reporting, training and expert assistance to improve nuclear safety worldwide. We are dedicated to that. A number of other countries besides the United States participate in this effort. It is cooperative voluntary effort. I would stress that point.

To turn quickly to the GAO report, the focus on that, as we have heard, is information sharing and emergency response within the international nuclear community. On information sharing, we fully agree with the GAO that an active exchange of information from all powerplants could result in a significant increase in the level of operational safety worldwide.

For this reason, we have worked very hard through the NEA and IAEA to assure U.S. access to all available safety data and to encourage other countries to report fully and participate actively since there is so much to be gained from this pooling of information.

In establishing this as our main objective, we, of course, had to protect the information from public release so that we will continue to receive it, as I noted earlier.

In the area of emergency response, we agree with the GAO that a serious nuclear accident may well require the assistance of other countries. For this reason, NRC was part of the 1981-83 U.S. Government effort mentioned in the GAO report and in the discussion this morning to develop a convention within the context of the IAEA requiring notification and providing for mutual assistance during nuclear emergencies.

When this was not accepted by other countries, the result was two sets of guidelines by the IAEA that were prepared by groups of experts, and both have been discussed this morning. I have copies here for those who might be interested. One is "Guidelines for Reportable Events in a Transboundary Release of Radioactive Materials," which has been of much interest in connection with the Chernobyl event, and the other is a set of "Guidelines for Mutual Emergency Assistance in Connection With a Nuclear Accident or Radiological Emergency."

We have two sets of guidelines. I wanted to make that point clear.

In light of the accident at the Chernobyl plant and the call by President Reagan and the six other world leaders at the Tokyo Economic Summit for an international convention committing nations to report and exchange information on nuclear emergencies or accidents, we expect renewed interest among the summit parties and others in developing an international convention which would reference or incorporate the IAEA guidelines and which would commit the parties to report and exchange information consistent with these guidelines in the event of an accident. The emphasis there is on the reporting aspect, which is in one of these safety guidelines.

We would anticipate at this point that there will be discussions and consultations among the summit parties and others as to the best tactics for most effectively pursuing and international convention or other mandatory reporting mechanism. That will be under the lead of the executive branch. NRC, being an independent agency, would support the effort of any U.S. Government or IAEA activities that result from this.

We have already entered into, as I mentioned, many bilateral arrangements with other countries which obligate the parties to provide full advice about emergencies at nuclear facilities within our countries. These system have been exercised. For example, at the time of Three Mile Island, NRC swiftly and completely notified our arrangement partners, and even others, about what was happening there, even though there was no major release of radiation and none across national borders.

We do that regularly. In the case of the Chernobyl event, I might say that there has been an extensive international effort where our cooperating partners have provided us with a great deal of information about what was happening in, for example, Sweden, Finland, and other countries affected by the radiation. That has been compiled by NRC and fed into the EPA interagency task force to provide information about what was happening on an integraged, analytic basis

So in summary, Mr. Chairman, I would say that NRC believes that the merits of international nuclear safety cooperation in these

areas are self evident and we have a lot of activities going on to further the state of U.S. knowledge and readiness in both of these areas, especially in light of concerns worldwide following the Soviet accident. We look forward to assisting in the improvement of international nuclear safety efforts in the near future.

Thank you, Mr. Chairman.

Senator COCHRAN. Thank you very much, Mr. Shea. We appreciate your testimony.

In connection with the call for the international convention to which you referred and with which we are familiar, what would be the problem with trying to go even further and suggest a convention that would be designed not just to notify member nations about accidents or incidents, but would go further and try to help prevent them by imposing upon all signatories a requirement to accept inspection for safety purposes at all their civilian nuclear facilities?

Mr. SHEA. Mr. Chairman, as was mentioned earlier, that would be something that would have to be negotiated actively and discussed with the countries that would be party to that, and there could well be, I would expect, concerns about sovereignty and the costs and implications for them of requiring changes in the systems in their countries.

Many of them feel that their safety is quite adequate and they wouldn't need to upgrade their systems. You would have quite a bit of debate. It would have to be something negotiated and it would be best to get a full answer from our executive branch. I would suggest the State Department on that matter.

It, as was noted earlier, would be a matter of some sensitivity among the parties and ultimately, in any convention, you would have to get the agreement of all these countries. There would be a lot of concerns to be resolved.

Senator COCHRAN. The GAO witnesses commented about the incident reporting systems of IAEA and NEA. You also mentioned those. Do you have any additional observations to make about how these systems could be made to work even better, or are we expecting too much from them?

Mr. SHEA. I would say, Mr. Chairman, that as they have evolved to the present time, I think these systems are working quite well. I would, again, draw the distinction between the purpose of these systems being to assess data over the longer term, often 3 or 4 months after an event, to determine what we can learn from incidents, and the immediate notification in case of an accident, which is not their purpose.

Given their purpose, to make sure that people know about events and to have fuller exchange of information, I would say that we now have good mechanisms in place, both through the NEA and the IAEA, providing a good framework for exchange of information from countries operating nuclear power facilities.

I would like to see improvements in the area of the quality and depth of the reporting that comes into the systems, that is fuller disclosure by the countries about exactly what happened, for example. I think that would be of great benefit to us in analyzing them to see what implications they might have for safety in U.S. facili-

ties, and it would be beneficial to other countries as they do the same.

Senator COCHRAN. We mentioned the possibility of the International Atomic Energy Agency assuming more responsibility and being provided with additional resources to help provide inspection services internationally for nuclear power facilities.

What is your reaction to that suggestion? Is it appropriate, in your judgment, for IAEA to be the agency expected to carry out safety inspections?

Mr. SHEA. I would note that the IAEA has long had a major role in encouraging and improving nuclear safety, which has grown over the years and now, with a special Nuclear Safety Division of some 30 people, is actively working on a whole range of safety issues, such as the development of safety guides, providing teams of people, experts who will go to countries to visit their reactors and to advise on the safety there, that is already happening, and those visits are inspecting in a sense, but they are done at the request of the country being visited. They are not mandatory.

IAEA has many other activities going on, as well. So it would seem to me that there you would have a good basis to start from, a lot of expertise and experience from all of the countries in the world with nuclear power programs as members, an established mechanism, and so forth.

So I think that would be a good place to start rather than trying to create yet another international agency to deal with this. I think given that, you would still come back to the question about how far people would be willing to go, given concerns about sovereignty and the other matters I mentioned earlier, such as making these inspections mandatory. I think that would raise serious questions.

There have even been suggestions along those lines in the past that have not been well received by the membership, and everything that has emerged has been of a voluntary, informational type of character.

I should say when the IAEA currently visits nuclear plants, they provide the results of their assessments to the countries inspected, if you will, in confidence for their use to improve safety. But there is no publication of these results. This is another sensitive area that would have to be looked at.

Senator COCHRAN. I think it is encouraging to recognize that an agency was established in March 1985, the International Nuclear Safety Advisory Group, which, as you observe, does provide a forum for an exchange of information and identifies nuclear safety issues.

There was an interesting letter to the editor in the Washington Post following an editorial that the Post carried on the subject of the Chernobyl incident that describes this nuclear safety advisory group and the activities of it.

The writter of the letter is Manning Muntzing, who is a past president of the American Nuclear Society and a former Director of Regulation for the Atomic Energy Commission. I think we should put a copy of that in the record just to have that information available for the hearing record.[1]

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[1] See p. 69.

I also wonder whether or not you think there is a likelihood that the Soviets will respond favorably to your request for an exchange of visits now. I know that the Nuclear Regulatory Commission did have visits with the Soviet counterpart in 1978 and that you proposed another visit to discuss nuclear safety and a tour of nuclear facilities, and we are still awaiting a Soviet response.

What is your anticipation now about whether or not the Soviets will invite you to come over in view of the recent events?

Mr. SHEA. Well, I could only give a personal view on that. I would think that, in the near term, they will be so busy with dealing with the accident that I think it would not be likely that they would respond very soon to accept the kind of request that we have made for about a 10-day visit to see various facilities and hold discussions with people who are, no doubt, tied up extensively in dealing with the accident in their newly created safety organization which I might add, was created about 3 years ago.

However, I would hope that once those emergency problems are dealt with and the reactor accident is better understood that the Soviets would accept our proposal and, over the longer term, renew the exchange with us that we initiated last fall, seeing that it is perhaps in their interest to do so and in the interests of everyone.

Senator COHEN. What is your advice to the Congress on this? You are not up to provide us advice, maybe, but what should Congress do to try to help promote better relationships as far as nuclear safety and exchange of information with the Soviets on this subject are concerned?

Mr. SHEA. I would think it would be a good question to discuss in part with the executive branch agencies, especially the State Department, for example, to see if provision of additional resources to the IAEA which could mean some added funding support from the United States would be worthwhile. Strong moral support, if you will, for their efforts in nuclear safety would also be quite useful, and perhaps to the United States, with the encouragement of the Congress, could consider whether it could renew again its efforts to have a convention to cover notification and mutual emergency assistance in cases of nuclear plant emergencies.

I think those are perhaps some steps that could be useful and might be considered.

Senator COCHRAN. As a result of the event at Chernobyl, do you think there is any extra reason for concern, evidence that here in the United States we need to take extra precautions to help guard against that kind of thing from happening here?

Mr. SHEA. I am probably not the right person to ask that question, Senator, given that it would involve an assessment of our domestic safety systems, and I am not a nuclear engineer. I think probably somebody from our safety side, such as Mr. Denton or Mr. Stello, would perhaps be best able to address that.

Senator COCHRAN. That does go beyond, I know, the subject of today's hearing. We are talking about international safety concerns and a framework for improving international cooperation, and that is the subject of the hearing.

We appreciate your contribution to our hearing today and your being here and answering our questions and providing information on the steps that are being taken by the U.S. Nuclear Regulatory

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Commission to help foster international cooperation and improving relationships among countries who have nuclear facilities.

We appreciate your being here and thank you very much for your participation.

Mr. SHEA. You are welcome.

Senator COCHRAN. This concludes our hearing.

[Whereupon, at 11:45 the subcommittee was recessed, subject to the call of the Chair.]

ADDITIONAL MATERIAL SUBMITTED FOR THE RECORD

TESTIMONY

OF

JAMES R. SHEA

DIRECTOR

OFFICE OF INTERNATIONAL PROGRAMS

U.S. NUCLEAR REGULATORY COMMISSION

BEFORE THE

SUBCOMMITTEE ON ENERGY, NUCLEAR PROLIFERATION, AND

GOVERNMENT PROCESSES

COMMITTEE ON GOVERNMENTAL AFFAIRS

ON

INTERNATIONAL NUCLEAR SAFETY ISSUES

MAY 8, 1986

Mr. Chairman and Members of the Subcommittee, I am pleased to testify before you on NRC's international activities and on the GAO Report "International Response to Nuclear Power Reactor Safety Concerns." I will give you first a brief overview of NRC's international cooperation activities and then comment on the GAO report.

The Office of International Programs performs and oversees two basic functions for NRC: (1) international cooperation regarding public health and safety and environmental questions in the operation of nuclear power facilities and (2) the administration of nuclear export and import licensing. My focus today will be on the first, namely, information exchange and cooperation with the international community regarding nuclear power safety.

Since 1974, NRC has formally entered into technical information exchange and general safety cooperation arrangements with the regulatory authorities of 21 other countries plus Taiwan. (Attachment 1 is a list of all NRC agreements in effect as of May 1, 1986.) These arrangements involve virtually all countries which are operating light water reactors of U.S. origin, all countries with reactors of U.S. design under construction, and several countries which at some time in the past have seriously considered acquiring U.S. nuclear power technology. The primary objective of these arrangements is to establish a formal channel for communications with foreign nuclear regulatory organizations to assure prompt and reciprocal notification of

reactor safety problems that could affect both U.S. and foreign nuclear facilities and to identify possible "precursor events" that warrant further investigation. (Since fully 40 percent of the nuclear steam supply systems designed by U.S. firms are located in foreign countries, data from these reactors provide substantial and important input to NRC's operating information data base from which they can and do influence NRC's regulatory decisions.) These agreements also provide a framework for bilateral cooperation on nuclear safety, safeguards, waste management and environmental protection and serve as a vehicle for NRC to provide assistance in improving nuclear health and safety practices in developing countries importing U.S. power reactors.

NRC's bilateral arrangements typically call for the exchange of all aspects of nuclear safety and regulatory information via such means as cables, telephone calls, technical reports, training courses, seminars, and joint discussions. In some cases they also provide for general cooperation in reactor safety research and for the long-term assignment of foreign regulatory personnel either to the NRC staff or to our programs at the national laboratories for on-the-job training in U.S. regulatory practices and procedures. In all cases, they provide for the protection of information which foreign countries have given us in confidence.

NRC has aimed its technical information exchange efforts principally at those countries which have adopted and are using U.S. light water reactor technology, but we have also approached some countries with other types of reactors about exchanging information in order to broaden the base of our

knowledge on problems of common interest. In this connection, I might note that NRC had exchanged visits with the USSR Ministry of Power and Electrification regarding cooperation in nuclear safety in 1978 and we were working at that time to develop a draft information exchange arrangement similar to those we have concluded with other countries. All efforts on this project were called to a halt in 1979, however, as part of the U.S. Government's protest against the Soviet advance into Afghanistan. This draft agreement remained dormant until recent months when NRC proposed a trip to the USSR to discuss nuclear safety and to visit their nuclear facilities. This request is awaiting a Soviet response. The Chernobyl accident has now focused a spotlight on the need for prompt notification of other countries of radioactive releases from reactor accidents and the importance of making full disclosure about the causes and effects of such accidents as they become known.

To move on to NRC involvement in other areas of international cooperation and technical exchange, NRC has also entered into about 50 separate research agreements under which we cooperate with 14 countries in nuclear safety research projects both in the U.S. and abroad. Some of this cooperative research involves experiments performed in U.S. facilities with foreign countries making direct cash contributions, some of it involves the foreign country providing the results of research it has sponsored in an area of interest or need to the U.S. In other cases, experiments are performed overseas, and the U.S. either contributes instrumentation, test analysis and on-site experts, or makes direct cash contributions to the host program. Such

cooperation has the effect of maximizing limited research dollars by coordinating planning, defining priorities, and eliminating duplication of effort.

And finally, NRC works closely with such international organizations as the International Atomic Energy Agency (IAEA) in Vienna and the OECD's Nuclear Energy Agency (NEA) in Paris to implement their programs in the areas of health, safety, and environmental protection. The aim of the NEA's work in nuclear safety, which we fully support, is to use the more than 3,000 years of reactor operating experience of its 23 members to better understand reactor operations under all conditions in order to minimize hazards to workers and the public, to prevent accidents, and to reduce their consequences. Toward this end, we participate in the NEA's Incident Reporting System which has been established in cooperation with the Joint Research Center of the European Communities to facilitate the international exchange of information on abnormal events at nuclear power plants. NRC also participates in a similar reporting system recently set up by the IAEA which, we have tried to assure, will include good information from the Eastern Bloc countries (which do not belong to the NEA). These NEA and IAEA efforts typically involve assessments, several months after abnormal events occur, of lessons learned from the problems that have occurred. They are not intended to function as emergency reporting sytems during the course of an accident.

NRC's extensive interaction with the IAEA also includes technical support in nuclear safety for developing countries. NRC experts participate in IAEA-sponsored visits and assignments to advise developing countries on safety

and regulatory concerns in construction and operation of U.S.-supplied reactors. NRC staff members serve as lecturers in IAEA training courses conducted for developing countries in the U.S. and overseas. And NRC offices regularly host foreign regulatory and safety personnel in long-term, on-the-job training assignments and course attendance in the U.S. under IAEA fellowships.

As one further example of a major project we have undertaken, NRC had primary U.S. responsibility for supporting the IAEA's Nuclear Power Reactor Safety Standards (NUSS) program which, over 10 years, produced five broad codes of practice and some 50 safety guides for the use of the IAEA's member states. The result is a valuable compilation of safety advice and assistance for countries just entering the nuclear power field as well as for countries expanding an existing program. We believe it was a worthwhile effort.

Mr. Chairman, as the above testimony indicates, the NRC has an extensive international cooperative effort in information exchange, joint research, standards development, incident reporting, and provision of training and expert assistance dedicated to improving nuclear safety worldwide. A number of other countries besides the U.S. also participate actively in this effort, which is a cooperative, voluntary one.

Now, to turn my remarks to the GAO report. It focused, as we have just heard, on two main subject areas: information sharing and emergency response within the international nuclear community. On information sharing, NRC fully agrees

with the GAO that an active exchange of information from all nuclear power plants could result in a significant increase in the level of operational safety worldwide. It is for this reason that NRC has worked so diligently, both bilaterally and through its membership in both the NEA and the IAEA Incident Reporting Systems, to assure U.S. access to all available safety data and to encourage full reporting and participation by other countries. There is much to be learned from a pooling of information and NRC, through the mechanisms I have just described, has tried to see that the entire body of available knowledge is factored into the U.S. regulatory process so that our domestic power plants can reap the benefits. In establishing this as our primary objective, NRC has sometimes had to agree to keep the information being exchanged within specific confines, but this has been done to assure that those with the most immediate need to know (NRC and the reactor licensees) had access to the information that would help them. NRC remains committed to doing everything it can to further the international sharing of important nuclear safety data.

In the area of emergency response, NRC agrees with the GAO that a serious nuclear accident may well require the assistance of other countries. For this reason, NRC was part of the 1981-1983 U.S. Government effort mentioned in the GAO report to develop a "Convention" within the context of the IAEA requiring notification and providing for mutual assistance during nuclear emergencies. In light of the accident at the Chernobyl plant in the USSR and the call by President Reagan and the six (6) other world leaders at the Tokyo Economic Summit for an international convention committing nations to report and

exchange information on nuclear emergencies or accidents, we expect renewed interest among the Summit parties and others in developing an international convention which would reference or incorporate the IAEA guidelines and which would commit the parties to report and exchange information consistent with these guidelines in the event of a nuclear accident. We would anticipate that there will be discussions and consultations among the Summit parties and others as to the best tactics for most effectively pursuing an international convention or other mandatory reporting mechanism. NRC stands ready to assist any U.S. Government or IAEA activities in this regard. NRC, as I indicated earlier, has already entered into bilateral arrangements with many countries which obligate both parties, among many things, to provide full advice, both immediate and ongoing, about emergencies at nuclear facilities within our geographical boundaries. And in two cases we have formally agreed to provide specific technical advice and assistance, upon request, in the event of a nuclear accident.

NRC believes that the merits of international nuclear safety cooperation in the areas of information exchange and emergency response are self-evident. NRC is currently engaged in a wide range of activities to further the state of U.S. knowledge and readiness in both areas. Especially in light of concerns worldwide following the Soviet accident, we look forward to assisting in the improvement of international nuclear safety efforts in the near future.

(5/1/86)

NRC INTERNATIONAL ARRANGEMENTS/AGREEMENTS/CONTRACTS
IN FORCE

REGULATORY AND REGULATORY/SAFETY RESEARCH ARRANGEMENTS - 5 year	Originally Signed	Latest Renewal
1. France MRICE	June 28, 1974	Sept. 17, 1984
2. Sweden SKI	Dec. 6, 1974	Jan. 24, 1985
3. Spain CSN	Oct. 29, 1974	Sept. 28, 1984
4. Denmark DNAEP	Oct. 3, 1975	Sept. 29, 1980
5. Japan STA and ANRE	May 30, 1974	Dec. 31, 1985
6. Italy ENEA	May 29, 1975	April 1, 1981
7. United Kingdom H&SE	Mar. 13, 1975	April 7, 1986
8. FRG BMI	Oct. 1, 1975	July 6, 1981
9. Korea MOST	Mar. 18, 1976	Nov. 10, 1981
10. Brazil CNEN	May 20, 1976	Jan. 14, 1982
11. Switzerland FOE	Dec. 9, 1974	Aug. 10, 1982
12. The Netherlands NMSAE	Oct. 3, 1977	Sept. 15, 1984
13. Taiwan AEC*	Mar. 20, 1978	Aug. 3, 1983
14. Israel IAEC	May 19, 1978	April 11, 1983
15. Belgium (Belgian Government)**	June 6, 1978	
16. Greece GAEC	Oct. 18, 1978	Oct. 17, 1983
17. The Philippines PAEC	April 28, 1980	June 18, 1985
18. Finland STUK	Sept. 26, 1980	Sept. 25, 1985
19. Mexico CNSNS (Implementing Proc.)	April 8, 1981	
20. Egypt ENEA	June 8, 1981	
21. People's Republic of China NNSA (Protocol)	Oct. 17, 1981	
22. Yugoslavia FCEI	Sept. 19, 1985	

Regulatory Arrangements under negotiation: Argentina, Austria, Canada, Romania.

SPECIAL PROJECTS

1. FRG BMI Exchange of Classified Information	July 6, 1981***	
2. Exchange of Classified Information	March 5, 1984***	
3. France MRICE Exchange of Classified Information	June 15, 1984***	

RESEARCH ARRANGEMENTS (General)

1. EURATOM (Represented by CEC)	Mar. 19, 1979 (5)	Sept. 20, 1984 (5)
2. France CEA	Oct. 25, 1974 (5)	Sept. 12, 1980 (5)
3. FRG BMFT and attachment	Mar. 6, 1976 (5)	Apr. 30, 1981 (10)
4. Japan AEB	(continuing letters from 1962)	
5. Sweden STUDSVIK	Dec. 16, 1974 (5)	Feb. 23, 1981 (5)
6. United Kingdom AEA	Aug. 3, 1977 (5)	Aug. 3, 1982 (5)
7. Spain CSN	Nov. 15, 1985 (5)	

* Through AIT with the CCNAA
** Including Outline Plan for Research Cooperation with CEN/SCK Mol Laboratory
*** Termination upon mutual agreement

Arrangements/Agreements/Contracts 2 (5/1/86)

RES PROGRAM COOPERATIVE AGREEMENTS	Effective (Term)	Continued (Term)
Bilateral		
1. Belgium BN and CEN/SCK Severe Accident Research	Feb. 10, 1983 (4)	
2. Belgium Tractionel Thermal-Hydraulic Research	July 26, 1985 (5)	
3. Canada AECL Severe Accident Research	Feb. 10, 1984 (3) as amended	
4. Finland IVO PTS Research and Materials Tech.	June 7, 1984 (2)	
5. Finland VTT Thermal Hydraulics & Materials Res.	Feb. 28, 1985 (3)	
6. France CEA Predicting Heat Removal by Natural Convection (COMMIX-1A)	May 21, 1984 (2)	
7. France CEA Steam Generator Safety Research	June 8, 1982 (5) as amended	
8. France CEA Polymer Base Material Subjected to Beta Radiation	Dec. 3, 1984 (3)	
9. France CEA Fast Breeder Reactor Safety Research	June 21, 1983 (5)	
10. France CEA Waste Management	Jan. 10, 1984 (5)	
11. FRG MPA Gundremmingen KRB-A Reactor Pressure Vessel	Feb. 2, 1985 (1)	Extension until June 30, 1987
12. FRG KfK SIMMER-II/Transition Phase Phen.	April 25, 1984 (2) as amended	Extension being negotiated
13. FRG PNS/KfK Severe Accident Research	April 15, 1983 (4)	
14. FRG KfK/PHDR Reactor Safety Research Program at HDR Facility	Aug. 31, 1984 (5)	

Arrangements/Agreements/Contracts 3 (5/1/86)

15.	FRG BMFT Nuclear Safety Research Program at HDR Facility	Sept. 24, 1984 (5)	
16.	FRG BMFT Thermal Hydraulics	Feb. 6, 1985 (5)	
17.	Italy ENEA Severe Accident Research	Dec. 23, 1982 (4)	
18.	Italy ENEA Thermal-Hydraulic Research	Jan 23, 1986 (5)	
19.	Japan PNC CONTAIN/SIMMER/Super System Codes	Oct. 1, 1985 (1)	
20.	Japan JAERI SFD and Fission Product ST Research	Sept. 13, 1983 - Sept. 30, 1984	Oct. 1, 1984 - Sept. 30, 1987
21.	Japan PNC CONTAIN 1.0 for LMFBR Containment Anal.	Dec. 27, 1984 (3)	
22.	Japan JAERI ROSA IV	Feb. 1, 1984 (4)	
23.	Japan JAERI RadWaste Management	Nov. 7, 1984 (5)	
24.	Korea KAERI Severe Accident Research	Aug. 23, 1984 (3)	
25.	The Netherlands ECN Severe Accident Research	Feb. 15, 1983 (4)	
26.	The Philippines Thermal-Hydraulic Research	Aug. 7, 1985 (5)	
27.	Sweden SKI and STUDSVIK Thermal-Hydraulics	Feb. 25, 1985 (3)	
28.	Sweden SKI/STUDSVIK Severe Accident Research and Marviken ATT	Oct. 1, 1984 (5)	
29.	Switzerland BEW Thermal-Hydraulic Transients and ECCS Reflood	July 9, 1979 (4)	July 9, 1983 (4)

Arrangements/Agreements/Contracts 4		(5/1/86)
30. Switzerland BEW HSST and FM	July 9, 1979 (4)	July 9, 1983 (4)
31. Taiwan CCNAA-AIT (USNRC)* Probabilistic Risk Analysis and Severe Accident Response	Jan. 27, 1983 (4) as expanded	
32. Taiwan CCNAA-AIT (USNRC)* Severe Nuclear Accident Research	Oct. 12, 1984 (3)	
33. United Kingdom AEA Severe Accident Research	Sept. 30, 1983 (1) etc.	Oct. 1, 1985 (1)
34. United Kingdom AEA NRC-Sponsored Studies by SRS	Aug. 31, 1981 (3)	Aug. 31, 1984 (3)
35. United Kingdom AEA Modelling of LOCAs	Feb. 12, 1985 (3)	
Multilateral		
36. FRG BMFT - Japan JAERI 2D-3D Refill and Reflood Program	April 18, 1980 (5)	April 18, 1985 - Sept. 30, 1988
37. OECD Halden Reactor Project (Austria, Denmark, Finland, FRG, Italy, Japan, Netherlands, Norway, Sweden, UK)	Jan. 1, 1976 etc.	Period 1985 thru 1987
38. OECD LOFT (Austria, Finland, FRG, Italy, Japan, Sweden, Switzerland, UK)	Feb. 10, 1983 - Sept. 30, 1986	
RES CONTRACTS		
1. Battelle PNL - Japan NUPEC USNRC Steam Generator Safety Research Project	Jan. 1982 (5)	
2. FRG Battelle Institute Frankfurt Large Scale Demonstration of Nuclear Aerosol Behavior (DEMONA)	May 1, 1985 - April 30, 1987	

* USNRC works through AIT

RESPONSES OF NRC TO WRITTEN QUESTIONS SUBMITTED
BY SENATOR COCHRAN

QUESTION 1. WHAT HAVE WE DONE WITHIN THIS COUNTRY SINCE THREE MILE ISLAND TO IMPROVE ON THE DISSEMINATION OF OPERATING EXPERIENCE INFORMATION?

ANSWER.

CONSIDERABLE RESOURCES HAVE BEEN EXPENDED TO IMPROVE THE DISSEMINATION OF LESSONS LEARNED FROM OPERATING EXPERIENCE AND TO IMPLEMENT APPROPRIATE RESPONSE ACTIONS. GOVERNMENT AGENCIES, NUCLEAR UTILITIES AND OTHER MAJOR NUCLEAR ORGANIZATIONS HAVE REACTED TO THE CRITICISM ON THE INADEQUATE EXCHANGE OF INFORMATION RELEVANT TO SAFETY. THE NRC, FOR EXAMPLE, HAS REQUIRED ITS LICENSEES TO IMPLEMENT AN OPERATING EXPERIENCE ASSESSMENT FUNCTION THAT INCLUDES IN-HOUSE AND INDUSTRY-WIDE FEEDBACK. THE NRC ALSO REORGANIZED TO BETTER INCORPORATE THE LESSONS FROM OPERATING EXPERIENCE INTO ITS REGULATORY PROGRAMS. AMONG THE CHANGES WAS THE CREATION OF AN OFFICE FOR ANALYSIS AND EVALUATION OF OPERATIONAL DATA (AEOD). THIS OFFICE IS SPECIFICALLY DEVOTED TO THE REVIEW OF OPERATING EXPERIENCE, BOTH FOREIGN AND DOMESTIC. THE NRC HAS EXTENSIVELY REVISED ITS REPORTING REQUIREMENTS TO FOCUS MORE NARROWLY ON EVENTS OF POTENTIAL SIGNIFICANCE AND HAS MADE MAJOR IMPROVEMENTS IN THE DATA FILES. AS A RESULT, OPERATING EXPERIENCE, BOTH DOMESTIC AND FOREIGN, CAN BE RETRIEVED WITH MUCH INCREASED PRECISION AND COMPLETENESS.

QUESTION 1 (CONTINUED) - 2 -

THE DISSEMINATION OF OPERATING EXPERIENCE INFORMATION, BOTH DOMESTICALLY AND INTERNATIONALLY, HAS BEEN INCREASED AND STRENGTHENED. IN ADDITION, THE NRC HAS COMMITTED EXTENSIVE ADDITIONAL RESOURCES TO THE COLLECTION, ASSESSMENT AND FEEDBACK OF OPERATIONAL DATA. FOR EXAMPLE, THE NRC HAS CONTRACTED WITH THE OAK RIDGE NATIONAL LABORATORY TO SCREEN RELEVANT FOREIGN OPERATING EXPERIENCE ROUTINELY FOR LESSONS THAT MAY BE APPLICABLE TO THE U.S. PROGRAM. THE RESULTANT COMPUTERIZED FILE WAS ONE SOURCE FOR GAO'S INFORMATION. INFORMATION FROM THIS ACTIVITY IS ALSO FED BACK INTO THE U.S. PROGRAMS.

THE NUCLEAR UTILITIES HAVE ALL INCORPORATED AN OPERATING EXPERIENCE ASSESSMENT PROGRAM INTO THEIR OPERATING PROCEDURES. IMPLEMENTATION OF THE FUNCTION IS BASED ON NRC REQUIREMENTS AND INDUSTRY GUIDANCE.

THE NUCLEAR UTILITY INDUSTRY ALSO TOOK SIGNIFICANT INITIATIVES. THE INDUSTRY ESTABLISHED THE INSTITUTE OF NUCLEAR POWER OPERATIONS (INPO) TO PROMOTE EXCELLENCE IN THE OPERATION OF ITS MEMBERS' NUCLEAR POWER PLANTS, AND IT IMPLEMENTED A COMPUTER-BASED MESSAGE SYSTEM, CURRENTLY CALLED NUCLEAR NETWORK, AS A MEANS FOR RAPID, WIDESPREAD DISSEMINATION OF INFORMATION RELEVANT TO SAFE, EFFICIENT PLANT OPERATIONS. INPO OPERATES THE SIGNIFICANT EVENT EVALUATION AND INFORMATION NETWORK (SEE-IN), WHICH FEEDS BACK INFORMATION AND RECOMMENDATIONS FOR ACTION TO ITS MEMBERS BASED ON OPERATING EXPERIENCE, AS ONE OF ITS PRIMARY ACTIVITIES.

QUESTION 1 (CONTINUED) - 3 -

IN ADDITION, INPO CURRENTLY MANAGES AND OPERATES NUCLEAR NETWORK. IT IS USED ON A DAILY BASIS TO EXCHANGE INFORMATION AMONG ALL U.S. NUCLEAR UTILITIES OPERATING PLANTS; THE FOUR U.S. NUCLEAR STEAM SYSTEM SUPPLIERS (WESTINGHOUSE, GENERAL ELECTRIC, COMBUSTION ENGINEERING, AND BABCOCK AND WILCOX); SEVERAL MAJOR U.S. ARCHITECT-ENGINEERS AND CONSTRUCTORS OF NUCLEAR PLANTS; INPO'S THIRTEEN INTERNATIONAL PARTICIPANTS, AND THE MAJOR U.S. NUCLEAR ORGANIZATIONS (INPO, THE ELECTRIC POWER RESEARCH INSTITUTE, THE ATOMIC INDUSTRIAL FORUM, AND THE EDISON ELECTRIC INSTITUTE).

INPO AND THE NRC HAVE ONGOING PROGRAMS TO REVIEW THE UTILITIES OPERATING EXPERIENCE FEEDBACK ACTIVITIES. EFFORTS CONTINUE TO BE MADE TO IMPROVE ON THE UTILITIES' USE OF THE INFORMATION THAT IS PERTINENT TO THE SAFETY OF OPERATIONS OF THEIR PLANTS.

QUESTION 2: WAS ANY INFORMATION ON THE 1974 FIRE AT THE BROWNS FERRY PLANT IN TENNESSEE SHARED WITH THE IAEA, THE NEA, OR OTHER MEMBERS OF THE INTERNATIONAL COMMUNITY? WHAT ABOUT THE U.S. PUBLIC?

ANSWER.

YES. NRC SHARED FULL INFORMATION ON THE FIRE WITH THEM ALL, FIRST THROUGH PRESS RELEASES AND AFTERWARDS, IN 1975 AND 1976, IN OUR QUARTERLY REPORTS TO THE CONGRESS ON ABNORMAL OCCURRENCES, WHICH DETAILED THE CAUSES, THE ACCIDENT SEQUENCE, THE DAMAGE ASSESSMENT, AND THE MEASURES TAKEN TO PREVENT ANY RECURRENCE. COPIES OF THESE REPORTS WERE SENT TO THE IAEA, THE NEA, TO THE ADMINISTRATORS OF NRC'S BILATERAL EXCHANGE ARRANGEMENTS, AND TO ANY MEMBER OF THE U.S. PUBLIC WHO REQUESTED IT.

QUESTION 3A. WOULD YOU CLARIFY FOR US HOW THE NRC PROCESSES THE FOREIGN EVENT INFORMATION?

ANSWER.

AS PREVIOUSLY MENTIONED, THE NRC RECEIVES WRITTEN REPORTS ON FOREIGN NUCLEAR POWER PLANT OPERATING EXPERIENCE FROM TWO PRIMARY SOURCES - BILATERAL AGREEMENTS AND INCIDENT REPORTING SYSTEMS (IRS) OPERATED BY THE NUCLEAR ENERGY AGENCY (NEA) AND THE INTERNATIONAL ATOMIC ENERGY AGENCY (IAEA). INFORMATION RECEIVED FROM THESE SOURCES IS DISTRIBUTED FOR REVIEW AND ASSESSMENT TO THE MAJOR NRC PROGRAM OFFICES AND AEOD, THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS, INPO AND THE NUCLEAR OPERATIONS ANALYSIS CENTER (NOAC) AT OAK RIDGE NATIONAL LABORATORY. THE INFORMATION IS REVIEWED AND ASSESSED FOR ITS APPARENT SAFETY SIGNIFICANCE AS IT APPLIES TO THE U.S. PROGRAM. INFORMATION THAT APPEARS APPLICABLE RECEIVES FURTHER REVIEW AND REGULATORY AND/OR INDUSTRY ACTION WHERE APPROPRIATE. ITEMS OF MAJOR CONCERN ARE TRACKED TO COMPLETION.

AEOD SPECIFICALLY HAS A PROGRAM FOR COLLECTING, ASSESSING, STORING AND RETRIEVING REPORTED INFORMATION ON FOREIGN OPERATING EXPERIENCES AT LIGHT WATER REACTORS (LWRs). AEOD MANAGES A CONTRACT WITH NOAC FOR THE SCREENING OF THE FOREIGN REACTOR EXPERIENCE INFORMATION TO SELECT EVENTS OF SAFETY RELEVANCE TO U.S. REACTORS TO CATEGORIZE THESE EVENTS AS TO THE URGENCY OF FURTHER REVIEW, AND TO INDEX AND ABSTRACT THE EVENTS INTO A PROTECTED COMPUTER FILE, THE FOREIGN EVENTS FILE (FEF).

QUESTION 3A (CONTINUED) - 2 -

(NOTE: A LARGE PORTION OF THE INFORMATION SUPPLIED BY THE FOREIGN COUNTRIES IS PROVIDED ON A CONFIDENTIAL BASIS AND IS PROTECTED AS SUCH BY THE RECIPIENTS.)

THE FOCUS OF THE CONTRACT EFFORT HAS BEEN TO IDENTIFY EVENTS THAT MAY HAVE LESSONS PERTINENT TO THE U.S. PROGRAMS AND A RELATIVELY LOW THRESHOLD HAS BEEN APPLIED. THE SCOPE OF THE REVIEW WAS LIMITED TO LIGHT-WATER REACTORS (LWRs) THAT ARE GREATER THAN 200 MWE IN SIZE AND ARE SIMILAR TO U.S. DESIGNS BECAUSE THEIR OPERATING EXPERIENCE WAS EXPECTED TO PROVIDE THE MOST USEFUL INFORMATION FOR THE RESOURCES TO BE EXPENDED. IN FY 86, THIS SCOPE WAS EXPANDED TO INCLUDE OTHER LWRs FOR WHICH INFORMATION WAS MADE AVAILABLE THROUGH THE IAEA-IRS.

THE CONTRACTOR HAS BEEN CATEGORIZING EVENTS INTO FOUR CATEGORIES:

CATEGORY 1 - THOSE EVENTS OF OBVIOUS SAFETY SIGNIFICANCE THAT WARRANT IMMEDIATE FURTHER REVIEW BY THE NRC. THESE ARE THE EVENTS REFERRED TO AS "SIGNIFICANT" IN THE GAO REPORT. THE TWO EVENTS IN THIS CATEGORY IDENTIFIED POTENTIAL COMMON MODE COMPONENT FAILURES IN SAFETY SYSTEMS.

CATEGORY 2 - THOSE EVENTS THAT APPEAR TO HAVE SAFETY IMPLICATIONS AND WARRANT FURTHER REVIEW BY THE NRC. THESE ARE THE EVENTS REFERRED TO AS "POTENTIALLY SIGNIFICANT" IN THE GAO REPORT.

QUESTION 3A (CONTINUED) - 3 -

CATEGORY 3 - THOSE EVENTS THAT WARRANT OBTAINING ADDITIONAL INFORMATION BEFORE CATEGORIZING.

CATEGORY 4 - THOSE EVENTS THAT APPEAR TO BE INSIGNIFICANT BASED ON THE INFORMATION AVAILABLE. WHERE SUFFICIENT INFORMATION EXISTS, THE EVENTS ARE ABSTRACTED AND ADDED TO THE DATA FILE FOR FUTURE REFERENCE. OTHERWISE, ONLY A BRIEF TITLE IS STORED.

AEOD ITSELF SCREENS AND ASSESSES THE IRS DATA FROM NEA AND IAEA BECAUSE IT IS SPECIFICALLY PRESCREENED WITHIN THE ORIGINATING COUNTRY FOR FURTHER REPORTING. AEOD CATEGORIZES THESE DATA INTO FOUR CATEGORIES RELATIVE TO THEIR APPARENT APPLICABILITY TO THE U.S. PLANTS AND THE PROMPTNESS OF ATTENTION REQUIRED. THESE CATEGORIZATIONS ARE SUPPLIED TO NOAC TO ADD TO THE COMPUTERIZED FOREIGN EVENTS FILE (I.E., NOAC DOES NOT SEPARATELY CATEGORIZE THE IRS DATA).

THE COMPUTERIZED FEF IS BASICALLY A WORKING FILE THAT DOCUMENTS THE REVIEWER'S INITIAL ASSESSMENT OF THE EVENT. THE EVENT CATEGORIZATIONS ARE NOT UPDATED SUBSEQUENT TO NRC REVIEW. FOR EXAMPLE, IF AFTER NRC REVIEW A CATEGORY 1 OR CATEGORY 2 EVENT IS DETERMINED TO BE INSIGNIFICANT, THE DATA FILE FOR THAT EVENT IS NOT CHANGED TO A CATEGORY 4. IT IS NOT UPDATED BECAUSE THE RESOURCES REQUIRED CONTINUALLY TO TRACK THE RESULTS OF FURTHER REVIEWS AND TO DOCUMENT THE FINAL RESOLUTION WOULD BE LARGE. AS MENTIONED ABOVE, ITEMS THAT RECEIVE MAJOR ATTENTION ARE INCLUDED IN OTHER ACTION TRACKING SYSTEMS.

QUESTION 3B. WHAT IS THE DISTINCTION BETWEEN THE "SIGNIFICANT" AND "POTENTIALLY SIGNIFICANT" CATEGORIES AS USED IN THE FOREIGN EVENTS FILE?

ANSWER.

THE DISTINCTION BETWEEN "SIGNIFICANT" AND "POTENTIALLY SIGNIFICANT" HAS BEEN PRIMARILY THE REVIEWER'S JUDGMENT REGARDING THE URGENCY FOR FURTHER ASSESSMENT BY THE NRC. THE "SIGNIFICANT" EVENTS ARE JUDGED TO CONTAIN INFORMATION OF SUCH SAFETY IMPORTANCE THAT AN IMMEDIATE ASSESSMENT BY THE NRC IS WARRANTED. EVENTS ARE CATEGORIZED AS "POTENTIALLY SIGNIFICANT" WHEN THE INFORMATION APPEARS RELATED TO THE SAFETY OF U.S. PLANTS AND FURTHER EVALUATION BY THE NRC IS WARRANTED.

QUESTION 4: SHOULD THE IAEA'S ROLE BE EXPANDED INTO BEING THE MONITORING AGENT FOR SAFETY AND STANDARDS-SETTING FOR THE WORLD? IS THE AGENCY BEING TOO TIMID NOW?

ANSWER.

THE IAEA HAS PLAYED AND CONTINUES TO PLAY AN ACTIVE AND A CENTRAL ROLE IN THE DEVELOPMENT AND PROMULGATION OF INTERNATIONAL SAFETY STANDARDS AND IN THE PROVISION OF TECHNICAL ASSISTANCE, UPON REQUEST, TO ITS MEMBER STATES. NRC WORKS WITH THE IAEA AS PART OF THE U.S. GOVERNMENT EFFORT TO SUPPORT THE IAEA'S ACTIVITIES IN THE NUCLEAR SAFETY AREA. ADHERENCE TO OR ADOPTION OF THE IAEA'S SAFETY STANDARDS, CODES OF PRACTICES, RECOMMENDATIONS, AND GUIDELINES IS PURELY VOLUNTARY ON THE PART OF ITS MEMBERS, HOWEVER. THE IAEA, AS PRESENTLY CHARTERED, IS NOT AN INSPECTION AND ENFORCEMENT AGENCY FOR SAFETY AND ANY EFFORTS TO GIVE THE AGENCY SUCH A ROLE WOULD ENCOUNTER RESISTANCE FROM MEMBER STATES BECAUSE OF SOVEREIGNTY AND OTHER CONCERNS. ANY QUESTIONS ABOUT AN EXPANSION OR A REVISION OF THE IAEA'S CURRENT RESPONSIBILITIES SHOULD REALLY BE ADDRESSED TO THE DEPARTMENT OF STATE, WHICH SERVES AS THE IAEA'S PLANNING AND OVERSIGHT AGENCY IN THE FEDERAL GOVERNMENT.

QUESTION 5. WHAT CAN YOU TELL US ABOUT THE REACTORS THE U.S.S.R. IS BUILDING IN CUBA? ARE THEY THE SAME KIND AS CHERNOBYL? WILL THEY HAVE CONTAINMENTS?

ANSWER.

THE TWO REACTORS CURRENTLY UNDER CONSTRUCTION AT JURAGUA IN THE CIENFUEGOS PROVINCE ON THE SOUTHERN COAST OF CUBA WILL BE 440 MW(E) PRESSURIZED WATER REACTORS, LIGHT WATER COOLED AND MODERATED (THE SOVIET VVER-440 DESIGN). CALLED JURAGUA UNITS 1 AND 2, THEY ARE THE STANDARD SOVIET EXPORT MODELS. THE CHERNOBYL REACTORS, IN CONTRAST, ARE 1,000 MW(E) PRESSURE TUBE REACTORS, LIGHT WATER COOLED BUT GRAPHITE MODERATED (THE SOVIET RBMK-1000 DESIGN). WE BELIEVE THAT CONTAINMENTS ARE PLANNED FOR BOTH UNITS NOW UNDER CONSTRUCTION AT JURAGUA, AS THEY ARE FOR ALMOST ALL OF THE NEWEST GENERATION OF REACTORS THE SOVIETS ARE EXPORTING, AS WELL AS FOR THE TWO ADDITIONAL REACTORS THE CUBANS PLAN TO SITE THERE IN THE FUTURE. THE FIRST TWO UNITS ARE SCHEDULED FOR COMPLETION IN 1989.

reactor safety problems that could affect both U.S. and foreign nuclear facilities and to identify possible "precursor events" that warrant further investigation. (Since fully 40 percent of the nuclear steam supply systems designed by U.S. firms are located in foreign countries, data from these reactors provide substantial and important input to NRC's operating information data base from which they can and do influence NRC's regulatory decisions.) These agreements also provide a framework for bilateral cooperation on nuclear safety, safeguards, waste management and environmental protection and serve as a vehicle for NRC to provide assistance in improving nuclear health and safety practices in developing countries importing U.S. power reactors.

NRC's bilateral arrangements typically call for the exchange of all aspects of nuclear safety and regulatory information via such means as cables, telephone calls, technical reports, training courses, seminars, and joint discussions. In some cases they also provide for general cooperation in reactor safety research and for the long-term assignment of foreign regulatory personnel either to the NRC staff or to our programs at the national laboratories for on-the-job training in U.S. regulatory practices and procedures. In all cases, they provide for the protection of information which foreign countries have given us in confidence.

NRC has aimed its technical information exchange efforts principally at those countries which have adopted and are using U.S. light water reactor technology, but we have also approached some countries with other types of reactors about exchanging information in order to broaden the base of our

knowledge on problems of common interest. In this connection, I might note that NRC had exchanged visits with the USSR Ministry of Power and Electrification regarding cooperation in nuclear safety in 1978 and we were working at that time to develop a draft information exchange arrangement similar to those we have concluded with other countries. All efforts on this project were called to a halt in 1979, however, as part of the U.S. Government's protest against the Soviet advance into Afghanistan. This draft agreement remained dormant until recent months when NRC proposed a trip to the USSR to discuss nuclear safety and to visit their nuclear facilities. This request is awaiting a Soviet response. The Chernobyl accident has now focused a spotlight on the need for prompt notification of other countries of radioactive releases from reactor accidents and the importance of making full disclosure about the causes and effects of such accidents as they become known.

To move on to NRC involvement in other areas of international cooperation and technical exchange, NRC has also entered into about 50 separate research agreements under which we cooperate with 14 countries in nuclear safety research projects both in the U.S. and abroad. Some of this cooperative research involves experiments performed in U.S. facilities with foreign countries making direct cash contributions; some of it involves the foreign country providing the results of research it has sponsored in an area of interest or need to the U.S. In other cases, experiments are performed overseas, and the U.S. either contributes instrumentation, test analysis and on-site experts, or makes direct cash contributions to the host program. Such

cooperation has the effect of maximizing limited research dollars by coordinating planning, defining priorities, and eliminating duplication of effort.

And finally, NRC works closely with such international organizations as the International Atomic Energy Agency (IAEA) in Vienna and the OECD's Nuclear Energy Agency (NEA) in Paris to implement their programs in the areas of health, safety, and environmental protection. The aim of the NEA's work in nuclear safety, which we fully support, is to use the more than 3,000 years of reactor operating experience of its 23 members to better understand reactor operations under all conditions in order to minimize hazards to workers and the public, to prevent accidents, and to reduce their consequences. Toward this end, we participate in the NEA's Incident Reporting System which has been established in cooperation with the Joint Research Center of the European Communities to facilitate the international exchange of information on abnormal events at nuclear power plants. NRC also participates in a similar reporting system recently set up by the IAEA which, we have tried to assure, will include good information from the Eastern Bloc countries (which do not belong to the NEA). These NEA and IAEA efforts typically involve assessments, several months after abnormal events occur, of lessons learned from the problems that have occurred. They are not intended to function as emergency reporting systems during the course of an accident.

NRC's extensive interaction with the IAEA also includes technical support in nuclear safety for developing countries. NRC experts participate in IAEA-sponsored visits and assignments to advise developing countries on safety

and regulatory concerns in construction and operation of U.S.-supplied reactors. NRC staff members serve as lecturers in IAEA training courses conducted for developing countries in the U.S. and overseas. And NRC offices regularly host foreign regulatory and safety personnel in long-term, on-the-job training assignments and course attendance in the U.S. under IAEA fellowships.

As one further example of a major project we have undertaken, NRC had primary U.S. responsibility for supporting the IAEA's Nuclear Power Reactor Safety Standards (NUSS) program which, over 10 years, produced five broad codes of practice and some 50 safety guides for the use of the IAEA's member states. The result is a valuable compilation of safety advice and assistance for countries just entering the nuclear power field as well as for countries expanding an existing program. We believe it was a worthwhile effort.

Mr. Chairman, as the above testimony indicates, the NRC has an extensive international cooperative effort in information exchange, joint research, standards development, incident reporting, and provision of training and expert assistance dedicated to improving nuclear safety worldwide. A number of other countries besides the U.S. also participate actively in this effort, which is a cooperative, voluntary one.

Now, to turn my remarks to the GAO report. It focused, as we have just heard, on two main subject areas: information sharing and emergency response within the international nuclear community. On information sharing, NRC fully agrees

with the GAO that an active exchange of information from all nuclear power plants could result in a significant increase in the level of operational safety worldwide. It is for this reason that NRC has worked so diligently, both bilaterally and through its membership in both the NEA and the IAEA Incident Reporting Systems, to assure U.S. access to all available safety data and to encourage full reporting and participation by other countries. There is much to be learned from a pooling of information and NRC, through the mechanisms I have just described, has tried to see that the entire body of available knowledge is factored into the U.S. regulatory process so that our domestic power plants can reap the benefits. In establishing this as our primary objective, NRC has sometimes had to agree to keep the information being exchanged within specific confines, but this has been done to assure that those with the most immediate need to know (NRC and the reactor licensees) had access to the information that would help them. NRC remains committed to doing everything it can to further the international sharing of important nuclear safety data.

In the area of emergency response, NRC agrees with the GAO that a serious nuclear accident may well require the assistance of other countries. For this reason, NRC was part of the 1981-1983 U.S. Government effort mentioned in the GAO report to develop a "Convention" within the context of the IAEA requiring notification and providing for mutual assistance during nuclear emergencies. In light of the accident at the Chernobyl plant in the USSR and the call by President Reagan and the six (6) other world leaders at the Tokyo Economic Summit for an international convention committing nations to report and

exchange information on nuclear emergencies or accidents, we expect renewed interest among the Summit parties and others in developing an international convention which would reference or incorporate the IAEA guidelines and which would commit the parties to report and exchange information consistent with these guidelines in the event of a nuclear accident. We would anticipate that there will be discussions and consultations among the Summit parties and others as to the best tactics for most effectively pursuing an international convention or other mandatory reporting mechanism. NRC stands ready to assist any U.S. Government or IAEA activities in this regard. NRC, as I indicated earlier, has already entered into bilateral arrangements with many countries which obligate both parties, among many things, to provide full advice, both immediate and ongoing, about emergencies at nuclear facilities within our geographical boundaries. And in two cases we have formally agreed to provide specific technical advice and assistance, upon request, in the event of a nuclear accident.

NRC believes that the merits of international nuclear safety cooperation in the areas of information exchange and emergency response are self-evident. NRC is currently engaged in a wide range of activities to further the state of U.S. knowledge and readiness in both areas. Especially in light of concerns worldwide following the Soviet accident, we look forward to assisting in the improvement of international nuclear safety efforts in the near future..

(5/1/86)

NRC INTERNATIONAL ARRANGEMENTS/AGREEMENTS/CONTRACTS
IN FORCE

REGULATORY AND REGULATORY/SAFETY RESEARCH ARRANGEMENTS - 5 year	Originally Signed	Latest Renewal
1. France MRICE	June 28, 1974	Sept. 17, 1984
2. Sweden SKI	Dec. 6, 1974	Jan. 24, 1985
3. Spain CSN	Oct. 29, 1974	Sept. 28, 1984
4. Denmark DNAEP	Oct. 3, 1975	Sept. 29, 1980
5. Japan STA and ANRE	May 30, 1974	Dec. 31, 1985
6. Italy ENEA	May 29, 1975	April 1, 1981
7. United Kingdom H&SE	Mar. 13, 1975	April 7, 1986
8. FRG BMI	Oct. 1, 1975	July 6, 1981
9. Korea MOST	Mar. 18, 1976	Nov. 10, 1981
10. Brazil CNEN	May 20, 1976	Jan. 14, 1982
11. Switzerland FOE	Dec. 9, 1974	Aug. 10, 1982
12. The Netherlands NMSAE	Oct. 3, 1977	Sept. 15, 1982
13. Taiwan AEC*	Mar. 20, 1978	Aug. 3, 1983
14. Israel IAEC	May 19, 1978	April 11, 1983
15. Belgium (Belgian Government)**	June 6, 1978	
16. Greece GAEC	Oct. 18, 1978	Oct. 17, 1983
17. The Philippines PAEC	April 28, 1980	June 18, 1985
18. Finland STUK	Sept. 26, 1980	Sept. 25, 1985
19. Mexico CNSNS (Implementing Proc.)	April 8, 1981	
20. Egypt ENEA	June 8, 1981	
21. People's Republic of China NNSA (Protocol)	Oct. 17, 1981	
22. Yugoslavia FCEI	Sept. 19, 1985	

Regulatory Arrangements under negotiation: Argentina, Austria, Canada, Romania.

SPECIAL PROJECTS

1. FRG BMI Exchange of Classified Information	July 6, 1981***	
2. Exchange of Classified Information	March 5, 1984***	
3. France MRICE Exchange of Classified Information	June 15, 1984***	

RESEARCH ARRANGEMENTS (General)

1. EURATOM (Represented by CEC)	Mar. 19, 1979 (5)	Sept. 20, 1984 (5)
2. France CEA	Oct. 25, 1974 (5)	Sept. 12, 1980 (5)
3. FRG BMFT and attachment	Mar. 6, 1976 (5)	Apr. 30, 1981 (10)
4. Japan AEB	(continuing letters from 1962)	
5. Sweden STUDSVIK	Dec. 16, 1974 (5)	Feb. 23, 1981 (5)
6. United Kingdom AEA	Aug. 3, 1977 (5)	Aug. 3, 1982 (5)
7. Spain CSN	Nov. 15, 1985 (5)	

* Through AIT with the CCNAA
** Including Outline Plan for Research Cooperation with CEN/SCK Mol Laboratory
*** Termination upon mutual agreement

Arrangements/Agreements/Contracts 2 (5/1/86)

RES PROGRAM COOPERATIVE AGREEMENTS	Effective (Term)	Continued (Term)
Bilateral		
1. Belgium BN and CEN/SCK Severe Accident Research	Feb. 10, 1983 (4)	
2. Belgium Tractionel Thermal-Hydraulic Research	July 26, 1985 (5)	
3. Canada AECL Severe Accident Research	Feb. 10, 1984 (3) as amended	
4. Finland IVO PTS Research and Materials Tech.	June 7, 1984 (2)	
5. Finland VTT Thermal Hydraulics & Materials Res.	Feb. 28, 1985 (3)	
6. France CEA Predicting Heat Removal by Natural Convection (COMMIX-1A)	May 21, 1984 (2)	
7. France CEA Steam Generator Safety Research	June 8, 1982 (5) as amended	
8. France CEA Polymer Base Material Subjected to Beta Radiation	Dec. 3, 1984 (3)	
9. France CEA Fast Breeder Reactor Safety Research	June 21, 1983 (5)	
10. France CEA Waste Management	Jan. 10, 1984 (5)	
11. FRG MPA Gundremmingen KRB-A Reactor Pressure Vessel	Feb. 2, 1985 (1)	Extension until June 30, 1987
12. FRG KfK SIMMER-II/Transition Phase Phen.	April 25, 1984 (2) as amended	Extension being negotiated
13. FRG PNS/KfK Severe Accident Research	April 15, 1983 (4)	
14. FRG KfK/PHDR Reactor Safety Research Program at HDR Facility	Aug. 31, 1984 (5)	

Arrangements/Agreements/Contracts 3 (5/1/86)

15.	FRG BMFT Nuclear Safety Research Program at HDR Facility	Sept. 24, 1984 (5)	
16.	FRG BMFT Thermal Hydraulics	Feb. 6, 1985 (5)	
17.	Italy ENEA Severe Accident Research	Dec. 23, 1982 (4)	
18.	Italy ENEA Thermal-Hydraulic Research	Jan. 23, 1986 (5)	
19.	Japan PNC CONTAIN/SIMMER/Super System Codes	Oct. 1, 1985 (1)	
20.	Japan JAERI SFD and Fission Product ST Research	Sept. 13, 1983 - Sept. 30, 1984	Oct. 1, 1984 - Sept. 30, 1987
21.	Japan PNC CONTAIN 1.0 for LMFBR Containment Anal.	Dec. 27, 1984 (3)	
22.	Japan JAERI ROSA IV	Feb. 1, 1984 (4)	
23.	Japan JAERI RadWaste Management	Nov. 7, 1984 (5)	
24.	Korea KAERI Severe Accident Research	Aug. 23, 1984 (3)	
25.	The Netherlands ECN Severe Accident Research	Feb. 15, 1983 (4)	
26.	The Philippines Thermal-Hydraulic Research	Aug. 7, 1985 (5)	
27.	Sweden SKI and STUDSVIK Thermal-Hydraulics	Feb. 25, 1985 (3)	
28.	Sweden SKI/STUDSVIK Severe Accident Research and Marviken ATT	Oct. 1, 1984 (5)	
29.	Switzerland BEW Thermal-Hydraulic Transients and ECCS Reflood	July 9, 1979 (4)	July 9, 1983 (4)

Arrangements/Agreements/Contracts 4		(5/1/86)
30. Switzerland BEW HSST and FM	July 9, 1979 (4)	July 9, 1983 (4)
31. Taiwan CCNAA-AIT (USNRC)* Probabilistic Risk Analysis and Severe Accident Response	Jan. 27, 1983 (4) as expanded	
32. Taiwan CCNAA-AIT (USNRC)* Severe Nuclear Accident Research	Oct. 12, 1984 (3)	
33. United Kingdom AEA Severe Accident Research	Sept. 30, 1983 (1) etc.	Oct. 1, 1985 (1)
34. United Kingdom AEA NRC-Sponsored Studies by SRS	Aug. 31, 1981 (3)	Aug. 31, 1984 (3)
35. United Kingdom AEA Modelling of LOCAs	Feb. 12, 1985 (3)	
Multilateral		
36. FRG BMFT - Japan JAERI 2D-3D Refill and Reflood Program	April 18, 1980 (5)	April 18, 1985 - Sept. 30, 1988
37. OECD Halden Reactor Project (Austria, Denmark, Finland, FRG, Italy, Japan, Netherlands, Norway, Sweden, UK)	Jan. 1, 1976 etc.	Period 1985 thru 1987
38. OECD LOFT (Austria, Finland, FRG, Italy, Japan, Sweden, Switzerland, UK)	Feb. 10, 1983 - Sept. 30, 1986	
RES CONTRACTS		
1. Battelle PNL - Japan NUPEC USNRC Steam Generator Safety Research Project	Jan. 1982 (5)	
2. FRG Battelle Institute Frankfurt Large Scale Demonstration of Nuclear Aerosol Behavior (DEMONA)	May 1, 1985 - April 30, 1987	

* USNRC works through AIT

RESPONSES OF NRC TO WRITTEN QUESTIONS SUBMITTED
BY SENATOR COCHRAN

QUESTION 1. WHAT HAVE WE DONE WITHIN THIS COUNTRY SINCE THREE MILE ISLAND TO IMPROVE ON THE DISSEMINATION OF OPERATING EXPERIENCE INFORMATION?

ANSWER.

CONSIDERABLE RESOURCES HAVE BEEN EXPENDED TO IMPROVE THE DISSEMINATION OF LESSONS LEARNED FROM OPERATING EXPERIENCE AND TO IMPLEMENT APPROPPIATE RESPONSE ACTIONS. GOVERNMENT AGENCIES, NUCLEAR UTILITIES AND OTHER MAJOR NUCLEAR ORGANIZATIONS HAVE REACTED TO THE CRITICISM ON THE INADEQUATE EXCHANGE OF INFORMATION RELEVANT TO SAFETY. THE NRC, FOR EXAMPLE, HAS REQUIRED ITS LICENSEES TO IMPLEMENT AN OPERATING EXPERIENCE ASSESSMENT FUNCTION THAT INCLUDES IN-HOUSE AND INDUSTRY-WIDE FEEDBACK. THE NRC ALSO REORGANIZED TO BETTER INCORPORATE THE LESSONS FROM OPERATING EXPERIENCE INTO ITS REGULATORY PROGRAMS. AMONG THE CHANGES WAS THE CREATION OF AN OFFICE FOR ANALYSIS AND EVALUATION OF OPERATIONAL DATA (AEOD). THIS OFFICE IS SPECIFICALLY DEVOTED TO THE REVIEW OF OPERATING EXPERIENCE, BOTH FOREIGN AND DOMESTIC. THE NRC HAS EXTENSIVELY REVISED ITS REPORTING REQUIREMENTS TO FOCUS MORE NARROWLY ON EVENTS OF POTENTIAL SIGNIFICANCE AND HAS MADE MAJOR IMPROVEMENTS IN THE DATA FILES. AS A RESULT, OPERATING EXPERIENCE, BOTH DOMESTIC AND FOREIGN, CAN BE RETRIEVED WITH MUCH INCREASED PRECISION AND COMPLETENESS.

QUESTION 1 (CONTINUED) - 2 -

THE DISSEMINATION OF OPERATING EXPERIENCE INFORMATION, BOTH DOMESTICALLY AND INTERNATIONALLY, HAS BEEN INCREASED AND STRENGTHENED. IN ADDITION, THE NRC HAS COMMITTED EXTENSIVE ADDITIONAL RESOURCES TO THE COLLECTION, ASSESSMENT AND FEEDBACK OF OPERATIONAL DATA. FOR EXAMPLE, THE NRC HAS CONTRACTED WITH THE OAK RIDGE NATIONAL LABORATORY TO SCREEN RELEVANT FOREIGN OPERATING EXPERIENCE ROUTINELY FOR LESSONS THAT MAY BE APPLICABLE TO THE U.S. PROGRAM. THE RESULTANT COMPUTERIZED FILE WAS ONE SOURCE FOR GAO'S INFORMATION. INFORMATION FROM THIS ACTIVITY IS ALSO FED BACK INTO THE U.S. PROGRAMS.

THE NUCLEAR UTILITIES HAVE ALL INCORPORATED AN OPERATING EXPERIENCE ASSESSMENT PROGRAM INTO THEIR OPERATING PROCEDURES. IMPLEMENTATION OF THE FUNCTION IS BASED ON NRC REQUIREMENTS AND INDUSTRY GUIDANCE.

THE NUCLEAR UTILITY INDUSTRY ALSO TOOK SIGNIFICANT INITIATIVES. THE INDUSTRY ESTABLISHED THE INSTITUTE OF NUCLEAR POWER OPERATIONS (INPO) TO PROMOTE EXCELLENCE IN THE OPERATION OF ITS MEMBERS' NUCLEAR POWER PLANTS, AND IT IMPLEMENTED A COMPUTER-BASED MESSAGE SYSTEM, CUPRENTLY CALLED NUCLEAR NETWORK, AS A MEANS FOR RAPID, WIDESPREAD DISSEMINATION OF INFORMATION PELEVANT TO SAFE, EFFICIENT PLANT OPERATIONS. INPO OPERATES THE SIGNIFICANT EVENT EVALUATION AND INFORMATION NETWORK (SEE-IN), WHICH FEEDS BACK INFORMATION AND RECOMMENDATIONS FOR ACTION TO ITS MEMBERS BASED ON OPERATING EXPERIENCE, AS ONE OF ITS PRIMARY ACTIVITIES.

QUESTION 1 (CONTINUED) - 3 -

IN ADDITION, INPO CURRENTLY MANAGES AND OPERATES NUCLEAR NETWORK. IT IS USED ON A DAILY BASIS TO EXCHANGE INFORMATION AMONG ALL U.S. NUCLEAR UTILITIES OPERATING PLANTS; THE FOUR U.S. NUCLEAR STEAM SYSTEM SUPPLIERS (WESTINGHOUSE, GENERAL ELECTRIC, COMBUSTION ENGINEERING, AND BABCOCK AND WILCOX); SEVERAL MAJOR U.S. ARCHITECT-ENGINEERS AND CONSTRUCTORS OF NUCLEAR PLANTS; INPO'S THIRTEEN INTERNATIONAL PARTICIPANTS, AND THE MAJOR U.S. NUCLEAR ORGANIZATIONS (INPO, THE ELECTRIC POWER RESEARCH INSTITUTE, THE ATOMIC INDUSTRIAL FORUM, AND THE EDISON ELECTRIC INSTITUTE).

INPO AND THE NRC HAVE ONGOING PROGRAMS TO REVIEW THE UTILITIES OPERATING EXPERIENCE FEEDBACK ACTIVITIES. EFFORTS CONTINUE TO BE MADE TO IMPROVE ON THE UTILITIES' USE OF THE INFORMATION THAT IS PERTINENT TO THE SAFETY OF OPERATIONS OF THEIR PLANTS.

QUESTION 2: WAS ANY INFORMATION ON THE 1974 FIRE AT THE BROWNS FERRY PLANT IN TENNESSEE SHARED WITH THE IAEA, THE NEA, OR OTHER MEMBERS OF THE INTERNATIONAL COMMUNITY? WHAT ABOUT THE U.S. PUBLIC?

ANSWER.

YES. NRC SHARED FULL INFORMATION ON THE FIRE WITH THEM ALL, FIRST THROUGH PRESS RELEASES AND AFTERWARDS, IN 1975 AND 1976, IN OUR QUARTERLY REPORTS TO THE CONGRESS ON ABNORMAL OCCURRENCES, WHICH DETAILED THE CAUSES, THE ACCIDENT SEQUENCE, THE DAMAGE ASSESSMENT, AND THE MEASURES TAKEN TO PREVENT ANY RECURRENCE. COPIES OF THESE REPORTS WERE SENT TO THE IAEA, THE NEA, TO THE ADMINISTRATORS OF NRC'S BILATERAL EXCHANGE ARRANGEMENTS, AND TO ANY MEMBER OF THE U.S. PUBLIC WHO REQUESTED IT.

QUESTION 6.c) IF WE ADD TOGETHER ALL THE REPORTED UNUSUAL NUCLEAR EVENTS IN COUNTRIES ABROAD, LEAVING ASIDE THE SOVIET BLOC, ISN'T IT TRUE THAT THE NUMBER IS MUCH HIGHER STILL?

ANSWER.

AS NOTED IN THE ANSWER TO 6A), THE NUMBER WOULD BE HIGHER BUT WE CANNOT CHARACTERIZE THE NUMBER.

[From the Washington Star, Oct. 1, 1979]

Soviets Think They've Solved Atom Safety Problems

(By John J. Fialka)

Moscow.—Convinced they have resolved all the major safety questions surrounding nuclear power, Soviet engineers will soon begin building large numbers of a new type of nuclear plant. They will be located near major cities and supply steam heat to homes and other buildings.

Unlike U.S. nuclear plant, which have concrete containment domes and, for safety reasons, are usually at least 20 miles away from cities, the new Soviet plants will have no domes and will be within 1½ miles of city boundaries.

Valery Velikhov, deputy director of the Soviet Union's prestigious Kurchatov Institute of Atomic Energy, told visiting U.S. reporters that construction of the plants will begin in the early 1980s and that the goal is to have them replace 30 percent of the "organic fuel" (oil, natural gas and coal) the Russians now use for space heating.

Rather than generating steam to turn turbines to create electricity, the new plants will be considerably more efficient because they will simply generate steam that will then be piped into the central heating system.

Velikhov said safety devices for this new type of plant "should be very rigid . . . since the whole system should be very close to consumers."

However, according to Yuri Syvintsev, the institute's safety director, the plants will be designed without the protective domes which, in Syvintsev's view, are "an unnecessary expense."

The concrete, a familiar feature on US. and Western European nuclear facilities, had long been regarded by U.S. engineers as a necessary last line of defense against the possibility that a major cooling pipe would break, spewing dangerous radioactive materials into the atmosphere.

Soviet engineers, on the other hand, have traditionally taken a more relaxed view of these and other nuclear safety precautions, building most of their nuclear plants without domes, although they have usually been located away from major population centers.

"There is no containment because we are developing an engineering solution that will make a loss of cooling accidents impossible," explained Velikhov, who said that the new plants, called "thermal stations" will operate at very low pressures and will be able to contain radioactive material within the reactor if an accident occurs.

Velikhov and Syvintsev gave the reporters an unprecedented view of the nation's future nuclear plans, which include underground burial of highly radioactive nuclear wastes and massive use of recycled plutonium as fuel—two concepts which are causing controversy in the United States, Japan and Europe.

"We do not see any problems here," explained Syvintsev, who said the Soviets will soon begin to concentrate high-level wastes into a glass-like substance and then bury them in salt deposits and abandoned coal shafts in unspecified "remote" areas.

Syvintsev said the only reason nuclear waste storage had not yet begun in Russia was a lack of money and equipment. "We hope to do it at the beginning of 1980," he said.

By the 1990s, according to Velikhov, the Russians hope to introduce a second new device, a "hybrid" fusion reactor to produce plutonium fuel for the thermal stations.

The Soviet Union, France and England have already constructed so-called breeder reactors, which are essentially hotter-running versions of current reactors. They also have the capacity to irradiate a blanket of natural uranium that surrounds the reactor core, causing some of the uranium to turn into plutonium, which can be used as a reactor fuel.

The hybrid reactor, which is also under discussion in the United States, is a new concept. It presupposes the invention of a fusion reactor, one that applies the thermonuclear reaction of the hydrogen bomb to power uses.

Given a breakthrough in fusion, which the Soviets expect within the next five years, engineers will then be able to turn fusion reactors into super breeders by wrapping layers of uranium around the reactor. Fast-moving atomic particles called neutrons would then bombard the uranium, turning it into plutonium.

Velikhov said present estimates are that a hybrid breeder could produce as much as 10 times the fuel of a conventional breeder reactor, vastly extending Russia's uranium supplies and putting the nation on what scientists call a "plutonium economy."

Last week Soviet officials announced at the International Atomic Energy Agency in Vienna, that they are pressing ahead with development of breeders and plutonium fuel despite President Carter's objection that a world-wide plutonium economy

could dangerously exacerbate problems of nuclear weapons proliferation. Plutonium is the principal material used in the manufacture of nuclear weapons.

Among other moves, Carter has postponed construction of a breeder facility and has halted the use of a plant in Barnwell, S.C., which would remove plutonium from nuclear wastes and reprocess it into new nuclear fuel.

Syvintsev said the Soviets had not yet built a plutonium reprocessing plant because the nation has not accumulated enough nuclear wastes to justify the operation of one on an economic basis. "We will have reprocessing in the 1980s," he added.

Asked for the basis of the Soviet Union's optimistic view of nuclear power, Syvintsev said Russian scientists were buoyed by the findings of an MIT study, headed by Dr. Norman Rasmussen, that said the chance of a person's being killed in a major nuclear power plant accident are about the same as the chance of being hit by a meteor.

(Hailed by the U.S. nuclear power industry when it was published last year, the Rasmussen study has recently come under criticism by scientists at the U.S. Nuclear Regulatory Commission who found the report's conclusions difficult to understand or to justify.)

Despite their optimistic mood, the Russians admitted there have been problems in the past.

"There were fatal accidents," said Syvintsev, who did not elaborate, except to say that the fatalities occurred at experimental facilities and not at operating nuclear power plants.

[From The Washington Post]

Matters of Nuclear Safety

(Letter to the Editor)

The editorial "Meltdown at Chernobyl" [April 30], suggesting that the International Atomic Energy Agency serve as an international forum for nuclear safety issues, was excellent.

Historically, the IAEA has been principally concerned with the detection of any diversion of nuclear material for unauthorized purposes. However, its charter also gives it ample authority to undertake nuclear safety programs.

In 1982, as president of the American Nuclear Society, I suggested that there should be enhanced international cooperation on nuclear safety, including the exchange of information on accidents as well as consideration of appropriate nuclear safety technical positions. The director general of the IAEA, Hans Blix, agreed and established, March 1985, the International Nuclear Safety Advisory Group.

The membership of this organization is composed of 13 leading nuclear experts from throughout the world, including the United States and Russia. The main functions of this organization are:

(1) to provide a forum for the exchange of information on generic nuclear safety issues of international significance;

(2) to identify important current nuclear safety issues and to draw conclusions on the basis of results of nuclear safety activities within the IAEA, and other information;

(3) to give advice on nuclear safety issues in which an exchange of information and/or additional efforts may be required;

(4) to formulate, where possible, commonly shared safety concepts.

In light of the Chernobyl accident with its international ramifications, it will be important for this international safety group of the IAEA to undertake major efforts that will contribute to nuclear safety worldwide, including prompt notification of events and adequate safety protective measures.

L. MANNING MUNTZING, Washington.

The writer is past president of the American Nuclear Society and former director of regulation for the Atomic Energy Commission.

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